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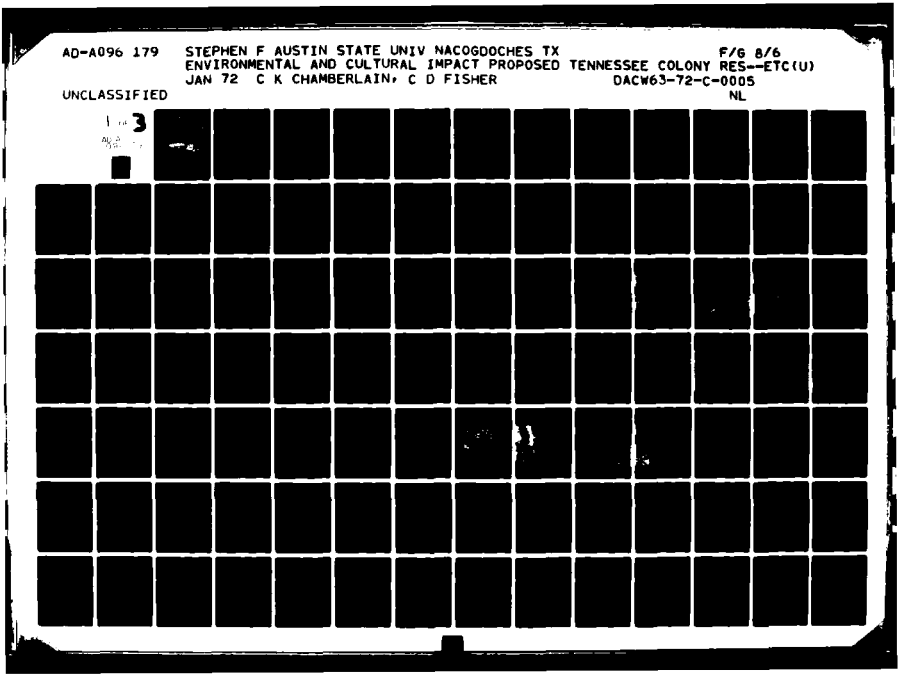

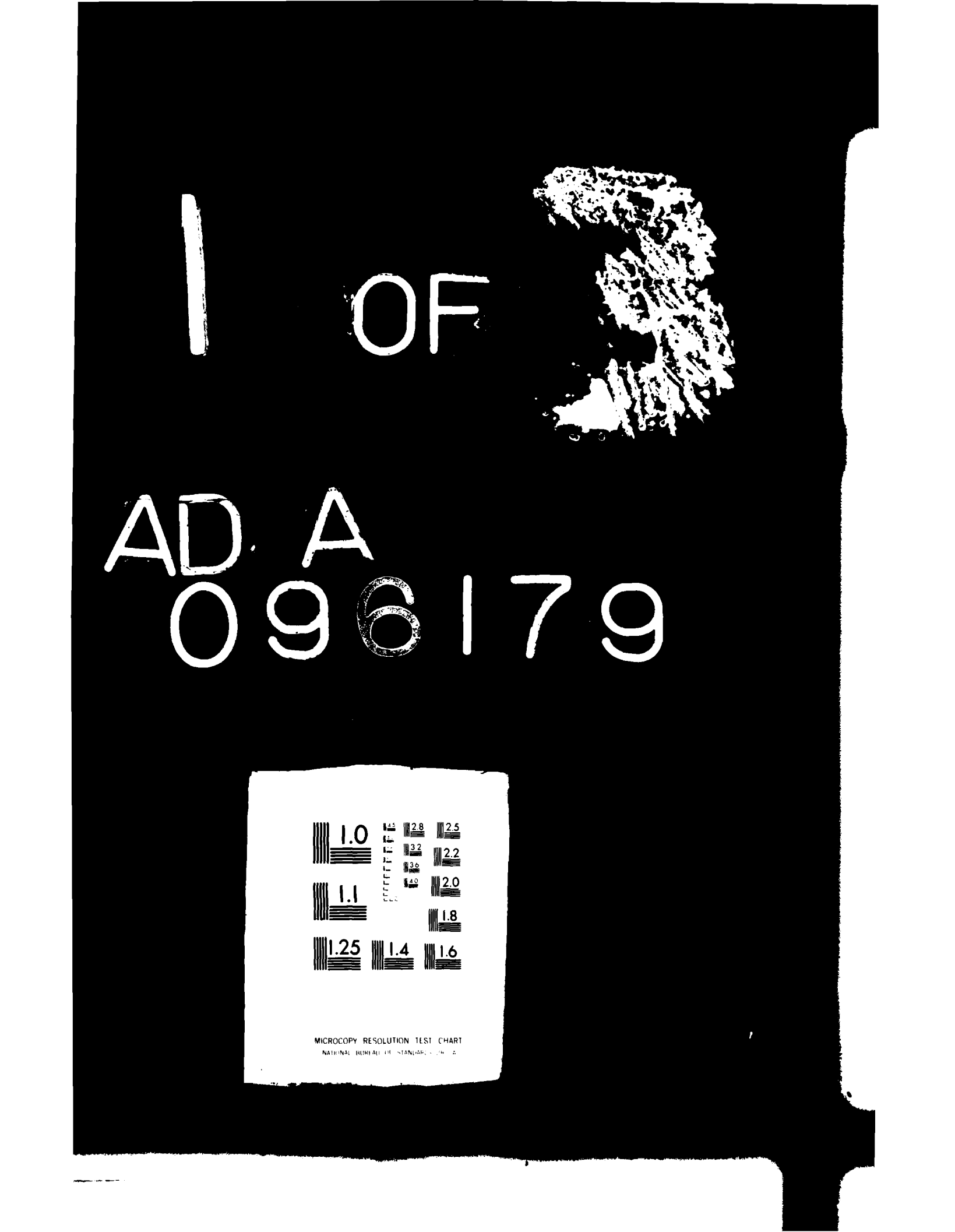
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ENVIRONMENTAL AND CULTURAL IMPACT

PROPOSED TENNESSEE COLONY RESERVOIR

JAN. 1972

TRINITY RIVER, TEXAS

by

STEPHEN F. AUSTIN STATE UNIVERSITY

Nacogdoches, Texas

BOTANY | EUTROPHICATION | LAND USE

ZOOLOGY | PESTICIDES | HISTORY

GEOLOGY | HYDROLOGY | ARCHAEOLOGY

VOLUME V
APPENDIX G

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C. D. Fisher
J. D. Mc Cullough
E. S. Nixon
F. L. Rainwater
J. R. Singer
H. L. Jones

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This is an interim report of the study concerned with environmental and cultural impacts of the proposed channelization of the Trinity River. This publication presents data concerning the environmental impact of the proposed Tennessee Colony Reservoir. This interim report consists of five volumes: volume one contains the summary report; volume two contains archaeological and historical elements, geological elements, and botanical elements; volume three contains zoological elements and eutrophication and pesticide elements; volume four contains forest hydrological and soil conditions for watershed

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20. management; and, volume five contains conceptual land use elements.

APPENDIX G

INTERIM REPORT

Phase I

ENVIRONMENTAL SURVEY OF THE TRINITY RIVER, TEXAS

CONCEPTUAL LAND USE PLAN IN VICINITY OF RESERVOIR CREATED BY DAM SITE 2-A, TENNESSEE COLONY

by
J. Robert Singer, D. Nat. Sc.
Assistant Professor of Forestry
Stephen F. Austin State University

In partial fulfillment of Contract No. DACW 63-72-0005

Fort Worth District
Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102

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ADVISORY STATEMENT AND ACKNOWLEDGEMENTS

This report presents the findings of an independent researcher. The inventory presented here is based solely on cited references, on-site field studies and experience of the author--a forester, watershed manager, and regional planner. The report has not been biased for any special-interest group.

The author wishes to thank Drs. R.D. Baker (aerial photography), K.G. Watterston(soils)and S.I. Somberg for their assistance in office and field. Some tedious, repetitious in nature, and detailed work was carried out by A.L. Christine and J.C. Jones. Assisting the author in the field were research assistants M.V. Bintliff, P.R. Burke, R.A. Flowers, and J.F. Ward. Maps were drafted by W.E. Bishop and J.F. Ward. Special thanks are extended to V. Clark, M.A. McCown and S. Greer for the typing of this report and to the wives and husbands for their support.

The cooperation of the Corps of Engineers in furnishing aerial photograph mosaics, maps, and helicopters for aerial reconnaissance has been of invaluable help.

The Texas Water Development Board, Texas Highway Department, and the U.S. Department of Agriculture's Soil Conservation Service gave unselfishly of their time and

knowledge. Acknowledgements are also extended to the Texas Forest Service and to Daniel L. Lay of Wildlife Services, Texas Parks and Wildlife Department.

This report has been coordinated through the Office of Development at Stephen F. Austin State University. Their cooperation is greatly appreciated.

ABSTRACT

The framework of a land use concept plan is presented. It is based on the interrelationship of land functions. Land capability serves as a guide for utilizing land to its best and highest environmental use without any degradation of the resource.

Regional land use, pending land use shifts, inhibiting factors for land use shifts and impoundment effects on land use shifts are discussed at the reconnaissance level. The study presents the soil areas for land use adjustments. The environmental impact analysis covers short and long range effects on the lithosphere, biosphere, cultural sphere and hydrosphere as these are all interrelated factors in land use.

The reporting format will facilitate the writings of an Environmental Impact Statement. The grid system on each map facilitates the location of all information on the map and consequently on the ground. Alternate land use patterns can be drawn from the section of soil areas for land use adjustment and location on the maps which have been drawn at a scale that compliment the reconnaissance scale of decision making.

INTRODUCTION

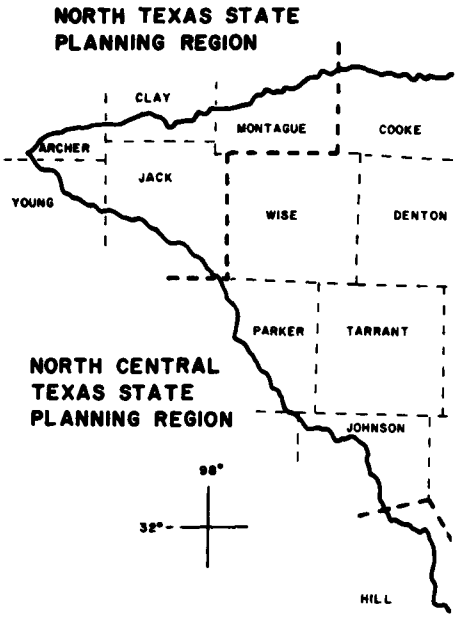
One of the major problems confronting land managers today is a lack of opportunity or willingness to view land management situations within a larger context. In this case, within the context of a conceptual land use plan. Often a discontinuity exists in the minds of some men on the interrelationship of "micro" land management decisions and overall land capability of the region.

In this reconnaissance study, present "micro" land uses have been viewed within the context of land capability after the establishment of a reservoir created by the proposed dam site Tennessee Colony, 2-A. The influence on hydrosphere, lithosphere, biosphere, and cultural sphere have been considered. Alternatives for land use adjustments--a tool to mitigate impact--are presented in terms of alternate uses and timing.

The proposed Tennessee Colony Reservoir will be multipurpose. This reservoir will provide water supply for large metropolitan areas, as well as flood control capacity, barge traffic capacity, and recreational potential. This Trinity River Basin reservoir, located between the Fort Worth-Dallas and Houston metropolitan areas will created a lake of approximately 245 square miles.

The geographical extent of this land use study is shown in Plate G-1. The 1993 square mile area of study includes portions of Anderson, Ellis, Freestone, Henderson, Kaufman, Navarro, and Van Zandt counties in Texas. The most northerly point of the reservoir is approximately 10 1/2 miles northeast of Ennis, Texas(Ellis County), and its most southerly point is the dam site 2-A located about 15 1/2 miles west, northwest of Palestine, Texas (Anderson County).

The uniqueness of each environmental factor requires overall considerations of all factors to determine the impact of the reservoir on land use. It was found appropriate to take the "alternate future" approach (Kahn and Wiener, 1967) and determine and define, at the reconnaissance level and from an holistic perspective, broad categories of capability of the land for development and use based on ecological considerations of lands surrounding the proposed reservoir. Hence, this concept land use plan shows a hierarchy of land function from most to least desirable use. This approach provides alternatives for individual land owner choice. It is also compatable with Bears (Darling and Milton, 1966, p. 139) discussion of "best possible use" and in conformance with the increasing recognition for the need of basing land use planning on ecological principles (McHarg,



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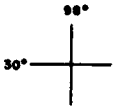

PLATE G-1

AREA OF STUDY:
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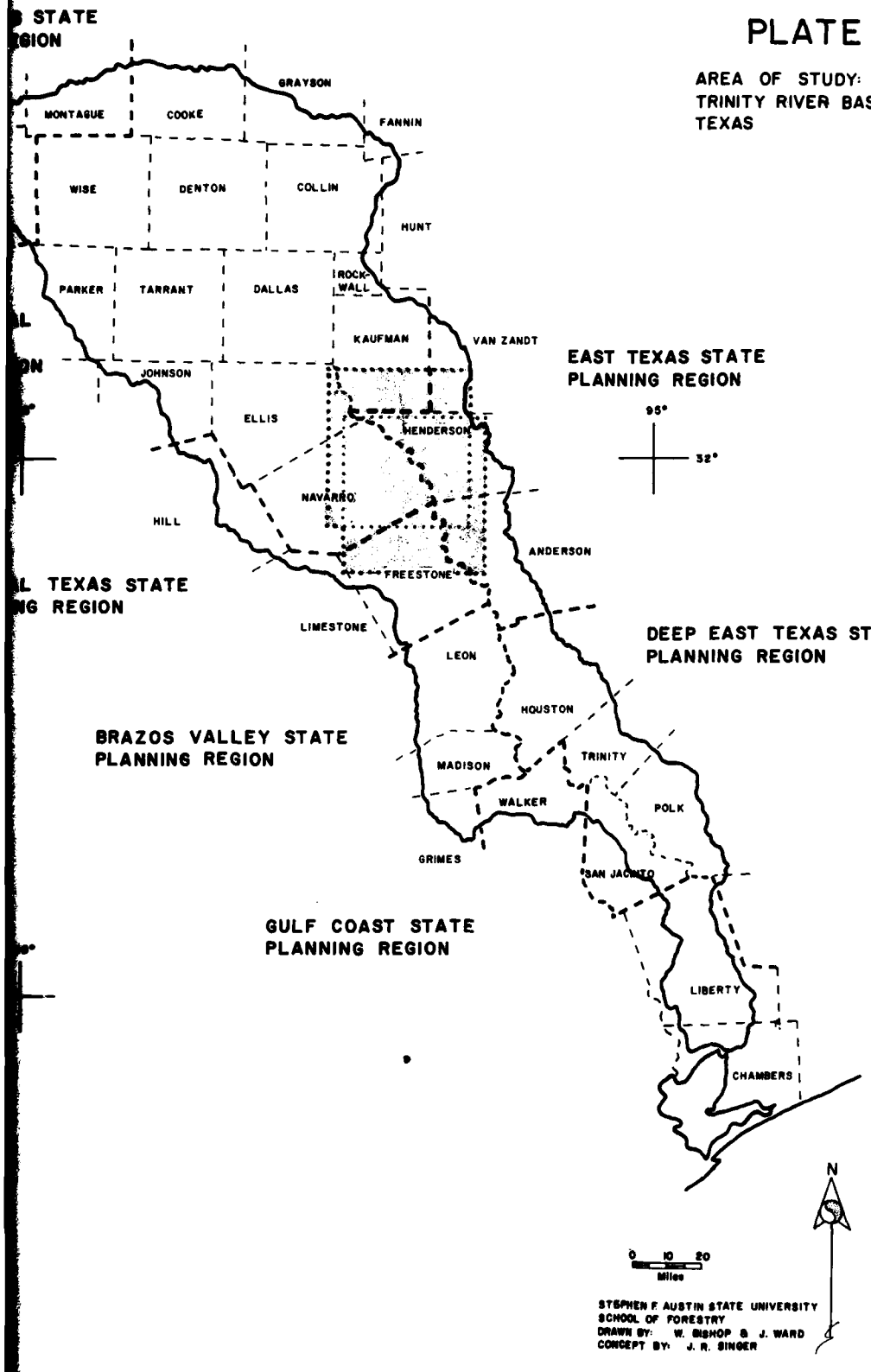

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CONCEPT BY: J. R. SINGER

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1966; Ripley and Buechner, 1967; McCormack, 1969; Peter and Pariente, 1971; Spurr, 1971).

The field plots for Appendix F also served for this study. Present land use for these areas was described on site. The section on Environmental Impact Analysis suggest adjustments needed to moved towards the conceptual land use plan.

This plan should be considered only as a reconnaissance level interim land capability plan. A complete description of present land use was outside the scope of this project. Perhaps the officials of the above named counties should proceed with this phase of the planning process, especially those areas that will be inundated. Finally, as this activity proceeds, the present study could serve as a basis for a detailed conceptual land use plan county by county.

PURPOSE

The purpose of this study was to determine, interpret, and evaluate the environmental impact of the construction of proposed Tennessee Colony Reservoir at site 2-a, on the land capabilities after construction of the reservoir. A conceptual land use plan was to be created that would present the overall land capability of the region with reservoir. Available land use alternatives

to mitigate the impact are identified.

This report can serve as a basis for the development of an environmental impact statement of a dam located at site 2-A. Requirements of said impact statement are found in the National Environmental Policy Act of 1969. Title I, Section 102-C of the Act requires that every recommendation or report on proposals for legislation and other major federal action significantly affecting the quality of the human environment include a detailed statement by the responsible officer.

Specific points to be addressed are:

(i) The environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should be proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term causes of man's environment and the maintenance and enchancement of long-term activity and,

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

This study was conducted in such a manner to provide information to the Corps of Engineers to facilitate writing said statement.

Further, this study may serve as a reconnaissance level basis for local counties to develop interim land

capability plans, capability and development plans, and land use plans.

STATEMENT OF OBJECTIVES

The objectives of this study were to:

1) conduct an inventory at the reconnaissance level of natural environmental strata relevant to a conceptual land use plan,

2) conduct an inventory at the reconnaissance level of cultural environmental strata relevant to a conceptual land use plan,

3) identify zones of relative impact caused by the reservoir and describe present land use therein,

4) identify areas of uniqueness in the natural environment that are limiting factors for land use adjustments,

5) develop complementary maps showing locations of the various limiting features,

6) develop a conceptual land use plan, based on land capabilities and other ecological considerations for land use adjustment in the vicinity of the reservoir,

7) present information on the various features listed above in a manner to facilitate the writing of an environmental impact statement for site 2-A required by law.

NATURE AND SCOPE

This study is the land use concept plan. It is a reconnaissance level interim land capability inventory of the Tennessee Colony Reservoir Area created by dam site

2-A, Trinity River Basin, Texas, after the reservoir has been filled.

The information for this report was gathered from laboratory and site analysis of 92.72 acre plots. Although the computerization of the data was not a part of the present project, much of it is in a format that can be easily placed on computer tapes. Print-outs from an IBM 360 computer would be at a compatable scale to the county road map scale of two miles to the inch. Since large amounts of data must be analyzed in studies of this nature, computerization of data should be considered in the future. In this case, however, the data was hand analyzed for the purposes and objectives stated above.

Some of the specific environmental strata identified and inventoried are:

1) forested, partially forested, and non-forested areas,

2) slope

3) aspect

4) drainage

5) soil associations

6) hydrological character of soil

7) soil capability limitations
   a. erosion hazard
   b. water in or on the soil
   c. shallow, droughty, or stony conditions

8) outcroppings of major and minor aquifers

9) population centers

10) public transportation routes

This data interpreted from a land capability perspective plus the impact zone data from the forest hydrological, soils, and watershed management conditions study provided the basis for creating the alternative land use choices. The highest and best use for each area lead the test for each area.

METHODOLOGY

The land use concept plan for the proposed Tennessee Colony Reservoir area is a reconnaissance level generalization of land use within the capability of the land resource to support use without land degradation. This land capabilities plan is based upon the identification of limiting factors such as aquifer outcrops, soil capability, slope, and impact zones. It is designed to serve only as a basis for a complete study of projected highest and best land use at the county level. Counties are herewith encouraged to initiate studies of present land use so that any transition from present land use to projected best land use can be made in an orderly manner.

The Soil Conservation Service soil survey served as a beginning base. Hence, the detail that can be provided

by the Soil Conservation Service in their regular farm planning activity is complimentary and is available to local land owners.

These soil interpretations (U.S.D.A., SCS, 1969) were analyzed for hydrologic capability and limiting factors. They served an an initial base for priority projections of alternate land use.

The Soil Conservation Service has divided the soil survey interpretations into eight capability classes and four capability subclasses for highest and best land use. Using the system developed by Singer and Miller (1972), soil capability was known within each 92.72 acre plot throughout the 1,993 square mile study area surrounding the proposed reservoir.

The capability classes and subclasses are described in the Capability Classification part of the section on criteria for a land use concept plan. These SCS capability are not restricted to the soil types or land area in this study. They are available for most areas in the nation. Therefore, this approach can be used in similar studies in other areas of the nation.

The first name of each type represents the upper layer of soil in each soil type profile. For the scope of this study, the characteristics for best land use were based on this top layer of soil. The appropriate soil

capability class was then delineated according to the surface slope of the land. At times small groups of capability classes fell within a larger class. In this case, the larger class was used as greater detail was not necessary at the reconnaissance level.

A listing of land uses from most to least desirable was determined on a 92.72 acre basis for each major capability class. This was accomplished by using a series of overlay worksheets showing percent slope, aspect, drainage, soil associations and boundaries, impact zone boundaries, land use capability classes, soil capability limitations, outcroppings of major and minor aquifers, population centers, public transportation routes, and forested regions. These overlays were place together forming a mosaic of the entire Tennessee Colony Reservoir area. This allowed comparison of interrelationships between as little as two or as many as ten environmental strata.

Limiting factors could be easily determined. This limiting factor information was transferred to a mylar overlay for final analysis and mapping. The overlays representing forest, fields, population centers, hydrologic characteristics of soils, and major and minor groundwater recharge areas were used as land capability modifers.

On-site observations were used as the final modifer. An example of on-site modification is the use of forested strips between pasture and reservoir. This will provide aesthetic value and wildlife habitat.

REGIONAL LAND USE

From a regional viewpoint, diversified agriculture is predominent in this portion of the Trinity River Basin. Various parts of the region will sustain only a certain type of agricultural land use or the basic land resource will be degraded. Erosion is one example of damage which might occur through the implementation of mislocated agricultural practice. Pollution of the reservoir waters and the groundwater table of the area may also result from future misallocation of land use for population centers, industires, transportational routes, and lands used for improved pasture. Specific uses are discussed in the following paragrpahs.

AGRICULTURE

Grazing

Livestock grazing, a major agricultural land use, is found both east and west of the river. However, it predominates on the east of the river channel, both in the bottomlands and uplands. A sizable amount of improved pasture land, in high value forage, exists in the lowlands. Several large cattle ranches have improved pasture for livestock. Unimproved pasture is predominant

on the smaller ranches, found on both uplands and in the bottoms. The pasture is usually cleared or partially cleared of deciduous trees of low timber quality.

The cattle industry has large land holdings in the proposed inundated and adjacent areas. These holdings are affiliated with the Texas Southwestern Cattleman's Association. Much of the land is improved pasture, particularly in the bottomlands. Two major ranches exist on the west side of the river channel. Their improved pasture extends from the upper bottomland slopes along the river onto the uplands. One acre of bottomland pasture is presently equal to four acres "on top". As prime bottomland is inundated, the pressure on all upland areas for pasture will increase.

Row Crops and Commercial Orchards

Row crop type agricultural land use is restricted primarily to the area west of the river channel, predominantly in portions of Navarro and Ellis counties. This is due mainly to soil types and rainfall patterns. Cotton is the major staple crop in this type of land use but some feed crops and a few commercial orchards producing peaches and pecans exist throughout.

FORESTRY

Timber

Wood lots of deciduous trees constitute the major forestry land use. These wood lots contribute varying amounts of cordwood for commercial and residential demands. A major timber industry does not exist in the region because the existing forest types having a limited economic value for lumber production.

Recreation

Recreation land use in this region is predominantly fishing and hunting on or around the river and its bottomland. Fishing on the river, some commercial but predominantly local resident recreation is important. Fishing also occurs on lakes, sloughs, and creeks. Hunting occurs in both bottomland and above the terraces of the river. Game harvests consist of deer, squirrel, and migratory waterfowl during their respective legal seasons. Very little development for camping and picnicking exist at present.

Present low intensity recreation activity on lands outside of but related to the reservoir may inhibit the use of the land for high intensity commercial activity. This will depend on land ownership patterns around the

reservoir. These reservoir adjoining areas are of prime importance for future high and low intensity recreational use. Their potential for economic advancement of the area and environmental protection should be set forth in a management and development plan specifically for the reservoir boundary. This work would be similar to the Ecological Vegetative Management Plan for Enid Lake (U. S. Army, Corps of Engineers, 1971).

MINING AND QUARRYING

Mining and quarrying occur in the form of petroleum and gravel extraction. Several large oil fields are producing petroleum and natural gas products. A large number of wells are located in these fields scattered throughout the region.

Lignite strip mining occurs in the vicinity of Big Brown Reservoir in the lower portion of the study area (map location 361, 362, 411, and 412) north of Fairfield. Evidence of gravel extraction was observed in the upper reservoir reaches. Description of this activity can be found in a companion appendix.

POPULATION CENTERS

Residential land use ranged from a major population center of over 22,000 inhabitants to single homesites

found throughout the region. Population centers or nodes have been categorized by large centers, medium centers, small centers and scattered homes. There are four centers with population above 10,000 and seven centers with a population range from 1,000 to 2,3000 inhabitants. The region has seven (7) centers with populations from 100 to 600 inhabitants. There are many connunites of less than 1000 inhabitants, and innumerable scattered single homesites (Table G-1).

The population centers were viewed strictly from the standpoint of land area occupied and its relation to other components of the environment. An analysis of the economic base of these population centers, although very important, was outside the scope of the study. One thought to be considered in our economic base study is a hierarchy of central place function as presented by Isard (1960, p. 222) and applied in Canada by Thoman (1971). Also, the flow of economic activity should be investigated.

TRANSPORTATION

Highway, rail, and airway transportation nodes and corridors were considered. It is the interrelation between this land use and other environmental elements that is of major interest in this study.

TABLE G-1. Major Population Nodes - Tennessee Colony Reservoir Region[1/]

Large Centers of Population		Medium Centers of Population		Small Centers of Population	
Greater than 10,000		1,000 to 10,000		Less than 1,000	
Node	Population	Node	Population	Node	Population
Corsicana	22,520	Malakoff	2,300	Eustace	575
Palestine	15,750	Fairfield	2,000	Richland	287
Ennis	11,550	Kerens	1,865	Powell	225
Athens	10,850	Trinidad	1,250	Streetman	221
		Mabank	1,100	Caney City	200
		Kemp	1,000	Emhouse	151
		Wortham	1,000	Rice	126

[1/] Source: Anon. 1972. Texas Almanac: 1970-1971. The Dallas Morning News Press, Dallas, Texas.

There are four major railroad routes running through the area, servicing the larger population centers. These railroads are: the Chicago, Rock Island, and Pacific; the Southern Pacific; the Fort Worth and Denver; and the St. Louis Southwestern Railway.

Servicing the region are eight main highway routes. They connect the larger population centers and provide access to areas outside the region. Their route numbers are: I. 45, U.S. 287, U.S. 175, U.S. 75, S.H. 488, S.H. 274, S.H. 59, and S.H. 31. A great number of secondary paved roads, improved dirt roads, and non-maintained dirt roads compose the transportation infrastructure of the region.

INDUSTRY

Commercial land use, especially private businesses, are located at and along the transportation nodes and corridors leading to the larger population centers. These businesses, although varying in nature from goods to services, are oriented to the agricultural life style of the region.

Large industrial or business companies are also found. Texas Power and Light Company has two electrical energy production sites in the region. One plant, located at Trinidad, is in operation at present. A second

site will produce electrical energy by the combustion of locally mined lignite. The lignite mining operation poses a problem of reclaiming spoil banks to environmentally appropriate land uses complementary to the entire region.

Throughout the region, underground oil and natural gas pipelines traverse the land. These run through both the upland and bottomland areas. Existing telephone and high-voltage power transmission lines also extend across the region.

WETLANDS

From a regional level environmental viewpoint, wetlands are classified as a necessary and important land use (McHarg, 1966). They include swampy areas, which exist predominantly in the river bottomland on poorly drained soils, and marshes located on or near existing lakes in the region.

Wetlands are a part of the natural water cycle in this area. Further, they provide habitat for migratory waterfowl and indigenous wildlife. Hence, they can be a basis for economic gain through development for recreational hunting.

Utilization of the wetland for wildlife habitat, especially for waterfowl, fits within the uses possible

through establishment of the "Green-tree Reservoirs" concept of the U. S. Department of Interior. These so-called "reservoirs" are flooded in the winter, when needed most by waterfowl, and provide recreation and water based aesthetics. In the spring, they could be drained and used for grazing during the growing season. These areas then can provide economic gain on a seasonal basis: winter hunting and summer grazing.

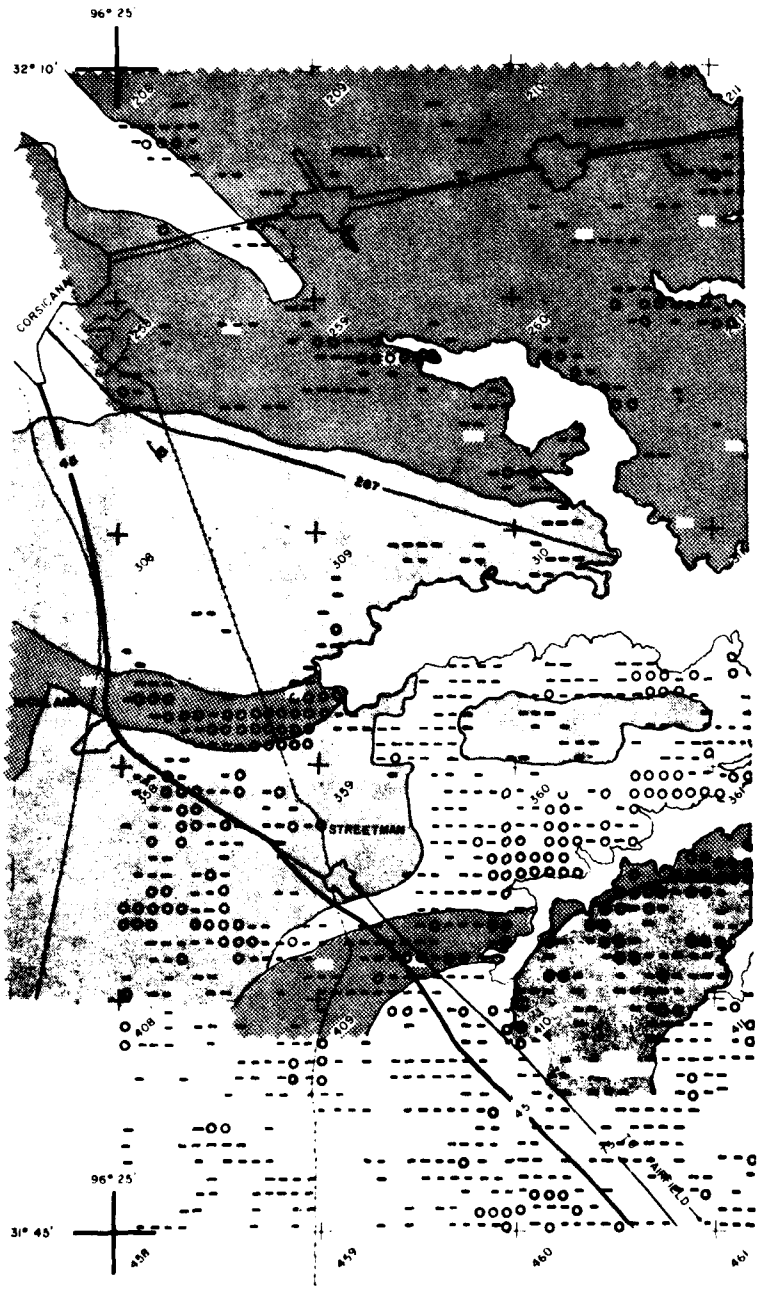
The habitat and hydrologic function are not the only values of wetlands as wetlands. These areas offer an alternative nondestructive land use within impact areas where other uses, such as agriculture, residential, or industrial, may damage the environment and be difficult and expensive to maintain. They could be viewed as natural areas of low intensity use and provide aesthetic values. In this capacity they can function as part of the base of economic generators for the region.

The preclusions or restriction of any intensive land use implies another type of value to the wetlands. They may function as guides to low intensity use, hence placing a higher value on lands available for more intensive use. Therefore, positive land use and value is gained from wetlands.

When the wetlands are viewed in this manner and low intensity man utilization is encouraged, the minus impact

values presently assigned to these areas are greatly mitigated. This kind of land use manipulation will change a negative value to a positive economic value.

Plates G-2 and G-3 show the population centers, forested areas and soil areas with wet conditions. Interrelationships can be easily seen between forestry (a "o" indicates the 92.72 acre plot is greater than 90 percent forested, a "-" indicates the 92.72 acre plot is about half forested), agriculture (the blank 92.72 acre plots indicate agricultural use), the proposed reservoir, population centers, major transportation facilities and soil areas with wet conditions. These are represented by Soil Capability Classes II and III which have limiting factors of erosion ("e"), wetness ("w"), and/or shallow, droughty, or stony conditions ("s"). Any 92.72 acre plot can be found by using the grid system shown in the map margins (with example "MD") and applying it to any quadrangle number. All quadrangle numbers are identified by a three digit number at a forty-five degree angle.



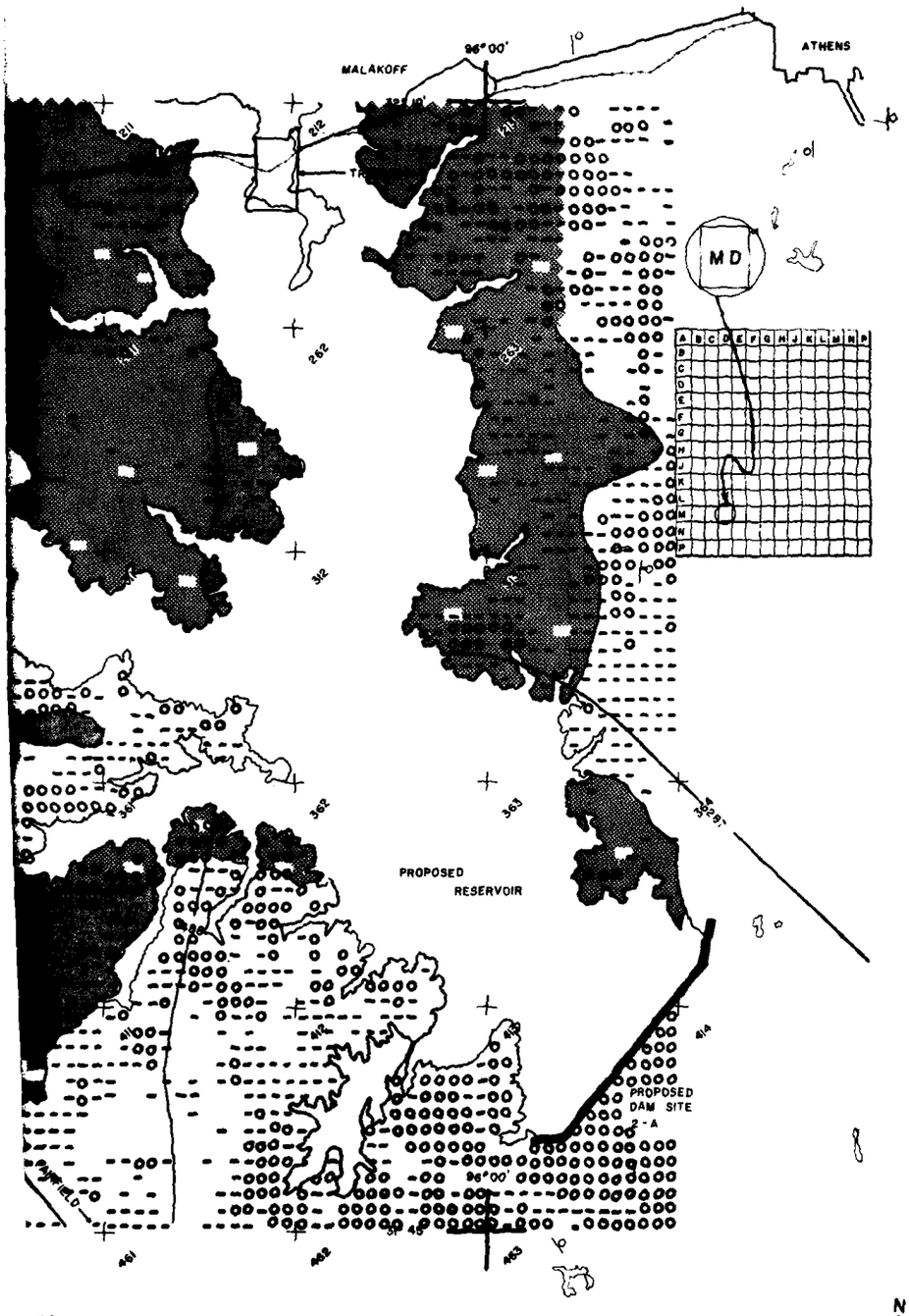
SOIL CAPABILITY CLASS II s, w, s
SOIL CAPABILITY CLASS III s, w, s

FORESTS ○ = >90% – = 40-60%

RAILROADS ——— AIRPORTS /o

PLATE G-2

POPULATION CENTERS,
FORESTS AND
WETLAND AREAS:
LOWER RESERVOIR REGION



PLATE

POPULATION CEN
FORESTS AND
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UPPER RESERVOIR

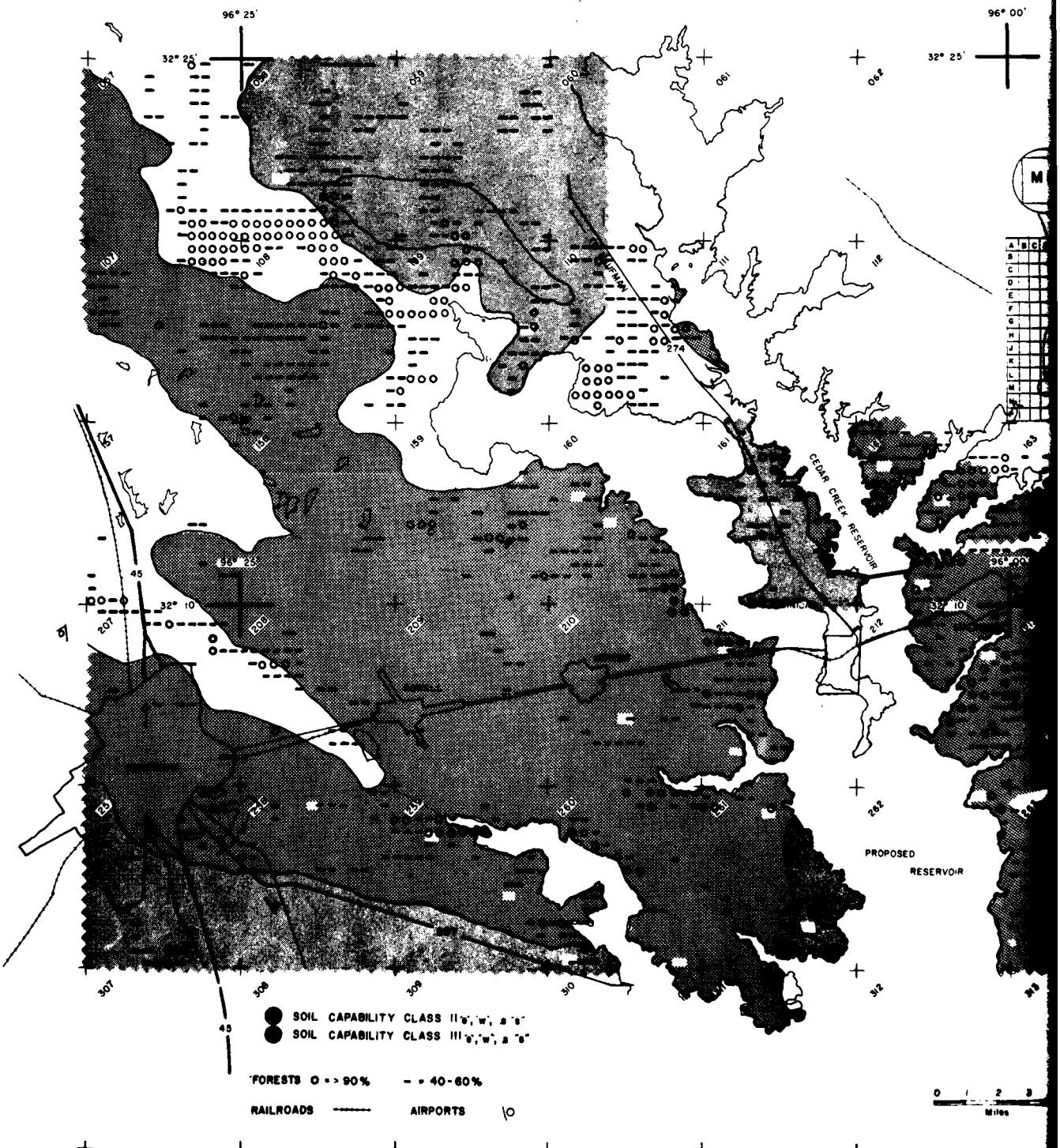

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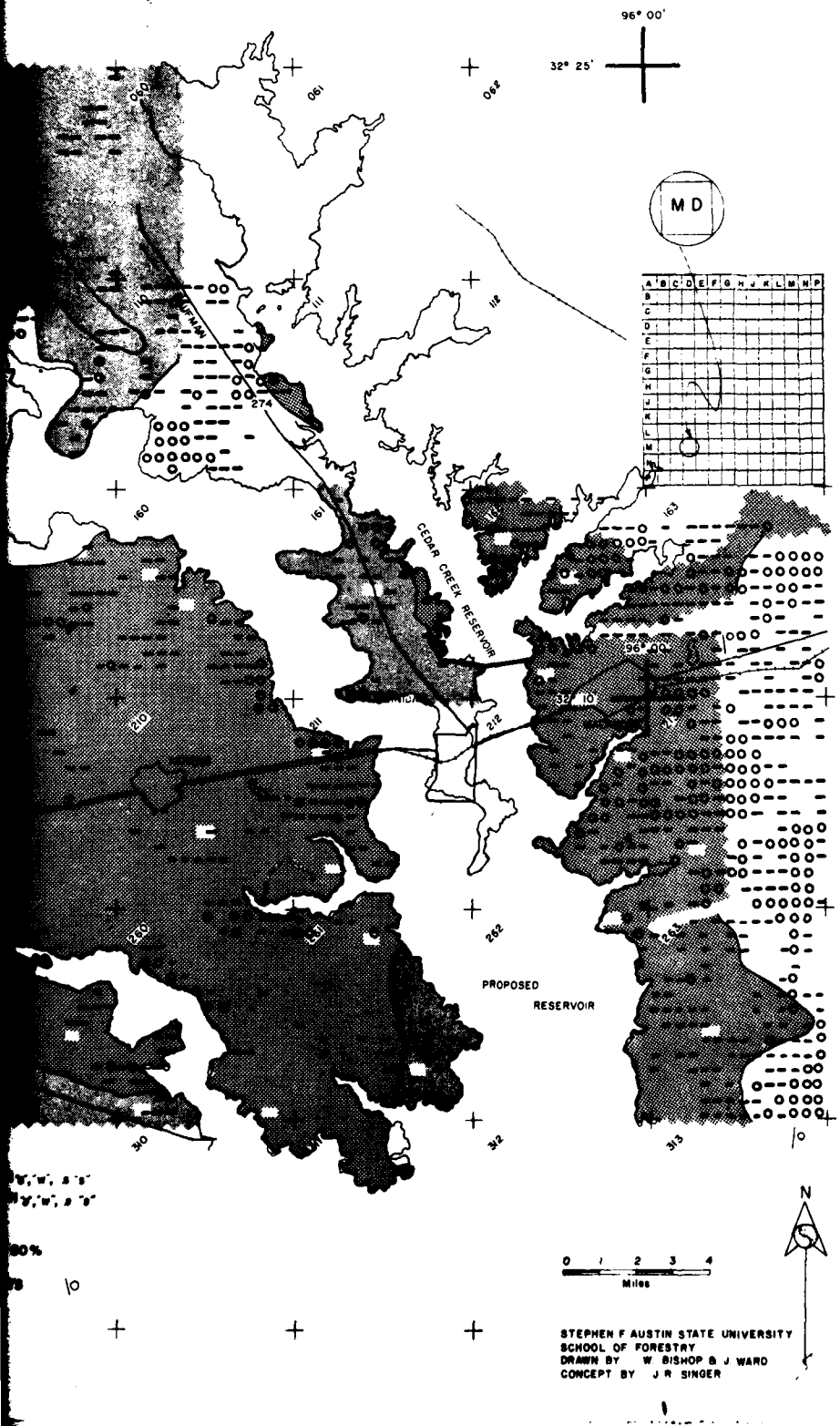
PLATE G-3

POPULATION CENTERS,
FORESTS AND
WETLAND AREAS:
UPPER RESERVOIR REGION



INHIBITING FACTORS INFLUENCING LAND USE SHIFTS

In the area of study, man presently has established a workable interrelationship with other mean and with the available natural resources. The inhabitants know what they must do to live within the capabilities of the available resources. Most practice good land husbandry.

With the filling of the proposed Tennessee Colony Reservoir, a new environment will be created in this region. A new resource base will exist. Man must gradually establish new workable interrelationship with other men and with the new available resource base. These inhibiting factors which will cause this shift are: impact areas, poor soils, goose lakes, geology, ground water recharge, water production, and specific land use nodes and corridors.

This new resource base--this new environment--is the same as the old with one exception; approximately 245 square miles of land is traded for a body of water. This change in use of eleven percent of the land base of the study area will increase intensity of use on the remaining land. Since use intensity will be increased we must consider the environmental factors that require low intensity use to maintain their value on a sustained

yield basis. These have been called "inhibiting" factors influencing land use shifts. They are really more of a guide to indicate which areas--in this new environment--cannot sustain high intensity use. These areas simply suggest that man must--in order to receive maximum return on capital investments--recognize a hierarchy of pr ductive capacity of the land. Low intensity use belongs on low productive capacity land; high intensity use belongs on high productive capacity land.

The guiding factors that must be considered are impact zones created by the reservoir, ground water recharge areas, soils, and wetlands.

IMPACT AREAS

A starting point was needed. Criteria for impact areas were developed from slope, soil drainage, and elevation of the land surface above the reservoir. Detail on impact areas can be found in Appendix F.

Our concern here is with impact areas as guides to land use shifts. Soil drainage classes range from excessive to very poor. The elevation modifier is based on increments of ten feet in elevation from the proposed reservoir surface. These criteria were used to determine the exact extent of the zones in which we can expect excessive moisture flux. Table G-2 shows the relative soil moisture

flux that can be expected. Table G-3 shows the zones of relative soil moisture flux that will influence land use shifts. They are ranked by acreage and located by quadrangle number. For example, Table G-3 shows that quadrangle number 412 contins 2,039.84 acres where soil moisture flux will be influence the greatest (-9). In looking at this area on Plate G-4 one observes that it is located directly north of the existing Big Brown Reservoir. Areas of soil moisture flux in the upper reservoir region are depicted on Plate G-5. The reader is referred to Tables F-4 and F-6, Appendix F, for a summary of the extent of these areas, the degree of on-site inspection and priority for remedial action.

Some examples to illustrate the validity of impact areas as guides for land use decisions follow. An excessively drained soil, ten feet in elevation above the reservoir and on a two and one-half percent slope has been designated as a minus nine area. This type of soil drains fast, and collects water fast. Thus in times of heavy sustained rainfall the area would become swampy, and unable to support high intensity use. In periods of drought, the area will become dry and parched thus still being unuseable. This great range of moisture flux makes the area useful to man only in a productive capacity of low intensity land use.

TABLE G-2. Impact Functions Matrix to Indicate Zones of Excessive Moisture Flux

Drainage Characteristic	Elevation above Impoundment in Feet				
	+10	+20	+30	+40	+50
1. Excessive	9	6	3	0	0
2. Well	6	3	0	0	0
3. Moderately well	3	3	0	0	0
4. Imperfect	6	6	3	3	0
5. Poor	9	6	3	3	0
6. Very poor	9	9	6	3	0

Indicator of zero reservoir effect on soil moisture flux

Note: Matrix numbers represent degree of relative impact.

TABLE G-3. Zones of Soil Moisture Flux Ranked by Acreage

Zones of Greatest Flux (-9)		Zones of Medium Flux (-6)		Zones of Minor Flux (-3)	
Map Location, Quadrangle No.	Acreage	Map Location, Quadrangle No.	Acreage	Map Location, Quadrangle No.	Acreage
109	4,636.00	*161	8,252.08	108	13,351.68
*162	2,410.72	*361	7,973.92	*263	5,934.08
312	2,132.56	*313	6,954.00	*159	4,450.56
*412	2,039.84	*208	5,748.64	107	4,357.84
160	1,947.12	309	5,285.04	259	4,265.12
*211	1,668.96	110	4,821.44	*359	3,894.24
362	1,483.52	*261	4,636.00	308	3,616.08
*212	1,205.36	308	4,450.56	307	3,523.36
*262	741.76	*363	4,172.40	261	3,245.20
		360	3,523.36	360	3,245.20
		362	2,967.04	310	2,781.60
		213	2,781.60	109	2,318.00
		*212	2,318.00	*158	2,318.00
		*311	2,318.00	258	2,039.84
		310	2,039.84	210	1,761.68
		260	1,576.24	311	1,668.69
		358	1,576.24	260	1,483.52
		160	1,483.52	413	1,205.36
		364	1,112.64	358	1,112.64
		411	1,112.64	*211	927.20

*Asterisk indicates areas field checked and discussed in section on environmental impact analysis

TABLE G-3 (Continued). Zones of Soil Moisture Flux Ranked by Acreage

Zones of Greatest Flux (-9)		Zones of Medium Flux (-6)		Zones of Minor Flux (-3)	
Map Location, Quadrangle No.	Acreage	Map Location, Quadrangle No.	Acreage	Map Location, Quadrangle No.	Acreage
		359	1,019.92	409	370.88
		262	927.20	408	278.16
		410	463.60	309	185.44
		412	463.60		
		462	278.16		
Subtotals in Acres	18,265.84		78,255.68		68,334.37

Total Area of All Zones -- 164,855.89 Acres.

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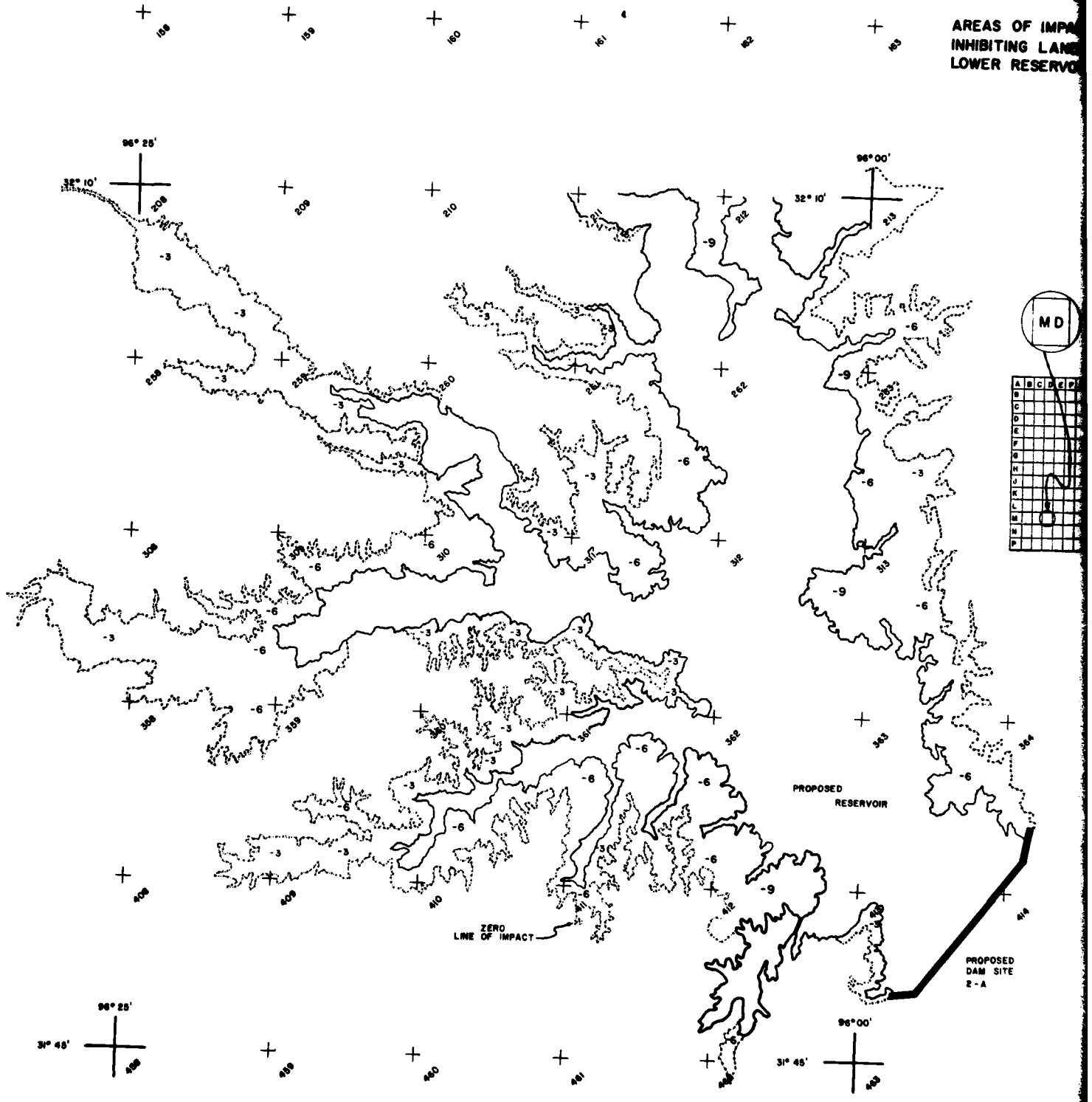

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PLATE G-4

AREAS OF IMPACT
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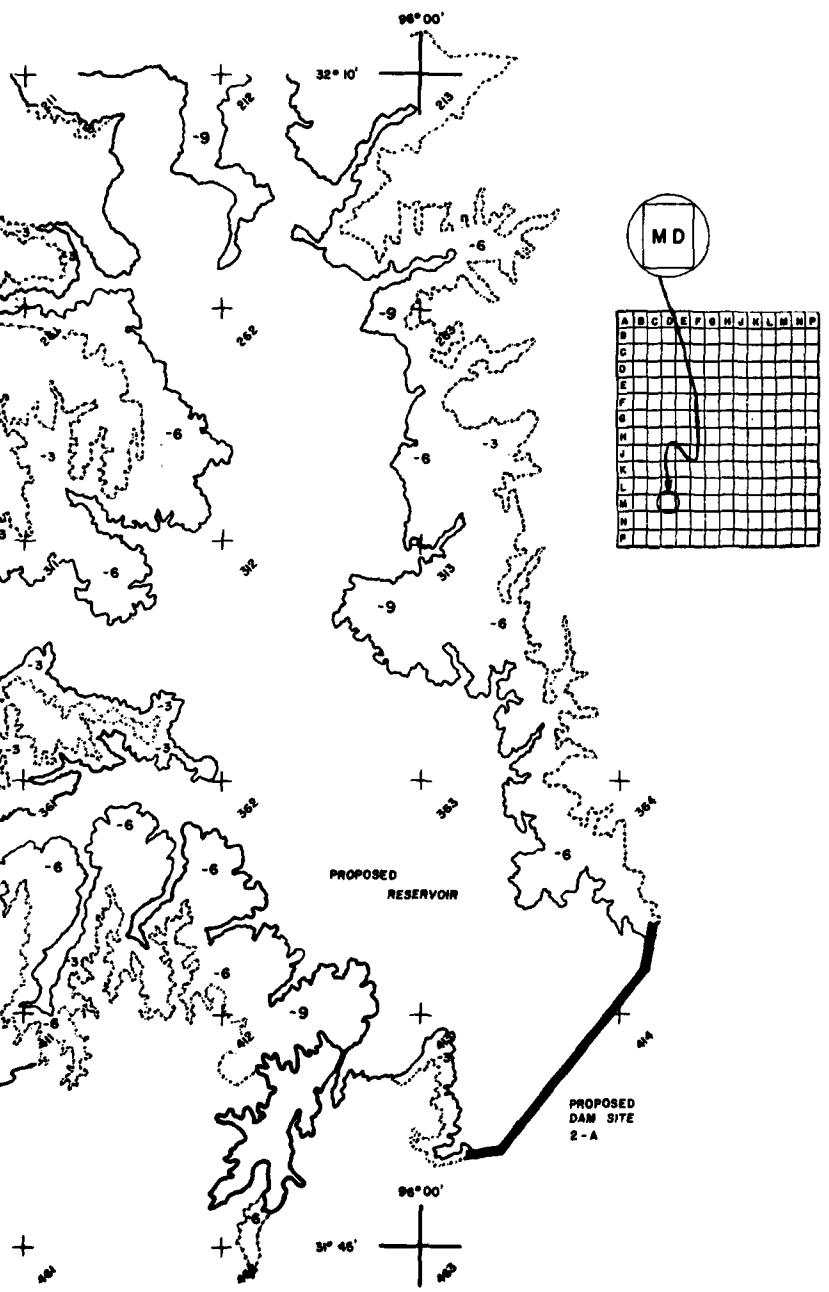

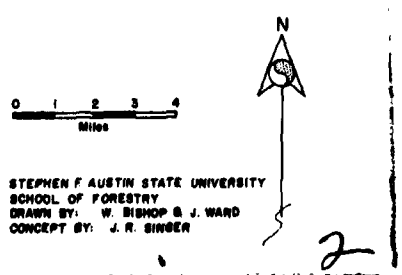

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CONCEPT BY: J. R. SINGER

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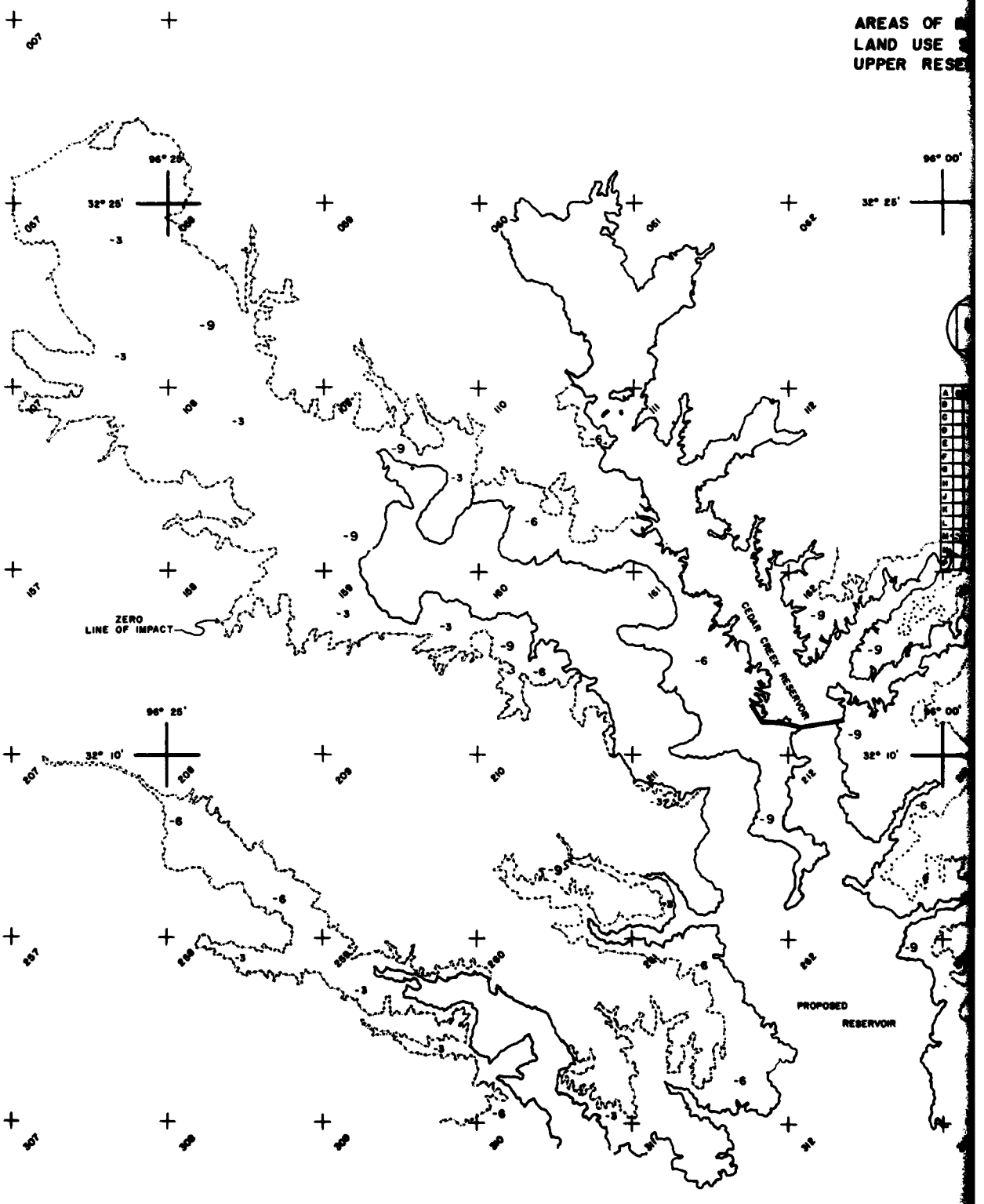

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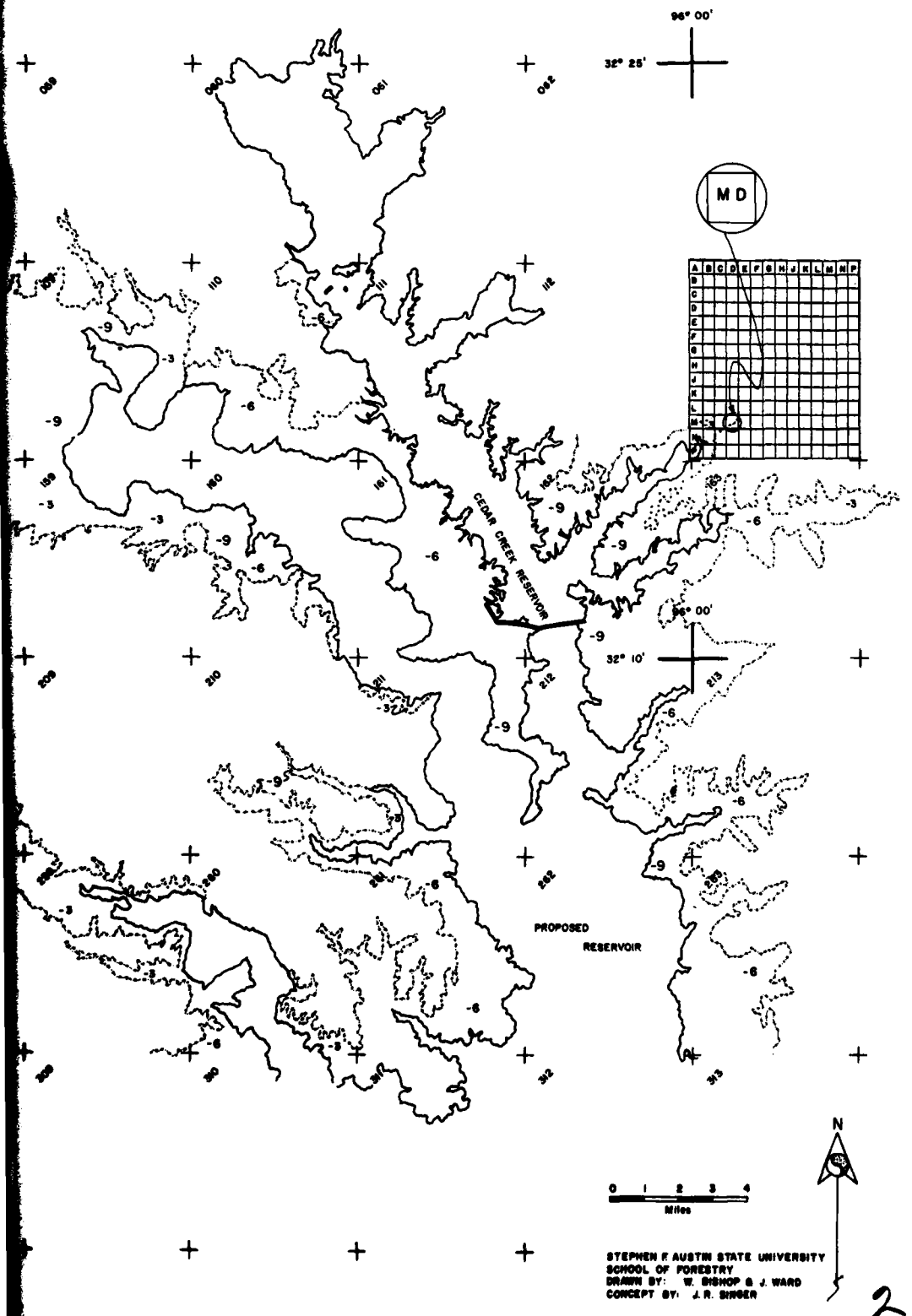
PLATE G-5

AREAS OF IMPACT INHIBITING LAND USE SHIFTS: UPPER RESERVOIR REGION



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CONCEPT BY: J. R. SINGER

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GROUND WATER RECHARGE AREAS

Ground water recharge is the ability of the land to recharge the underlying aquifer. The rate and degree of recharge depends on how fast water (usually precipitation) infiltrates the soil and percolates downward into the geological strata.

Land uses on aquifer outcrops should maximize the recharge potential. The limiting factor is not the aquifer outcrop. It is the combination of aquifer outcrop and indiscriminate land use. Plates G-6 and G-7 depict the areas where ground water recharge potential must be a consideration in land use allocation. Primarily it is concerned with any land use that increases surface water runoff and soil compaction, two phenomena that decrease recharge. Thus, any action that decreases recharge will prematurely force rapid changes in life style. Local recharge for local wells must be a constant consideration in any use of the land.

Carrizo-Wilcox

The Carrizo-Wilcox, a major aquifer outcrop, is present in a large portion of the study area. It is one of the most geographically extensive aquifers in Texas. It is an important source of well water for rural water

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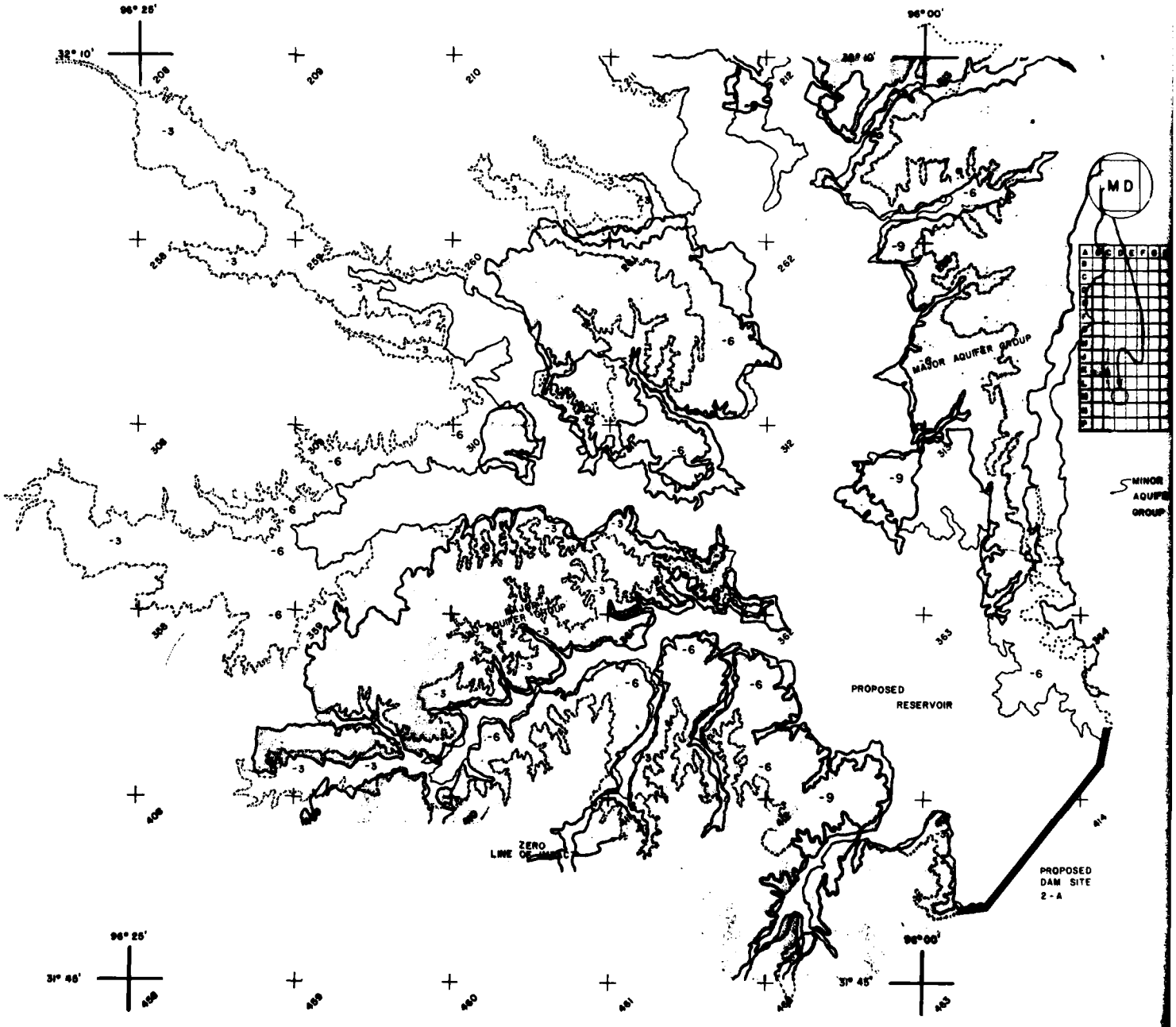

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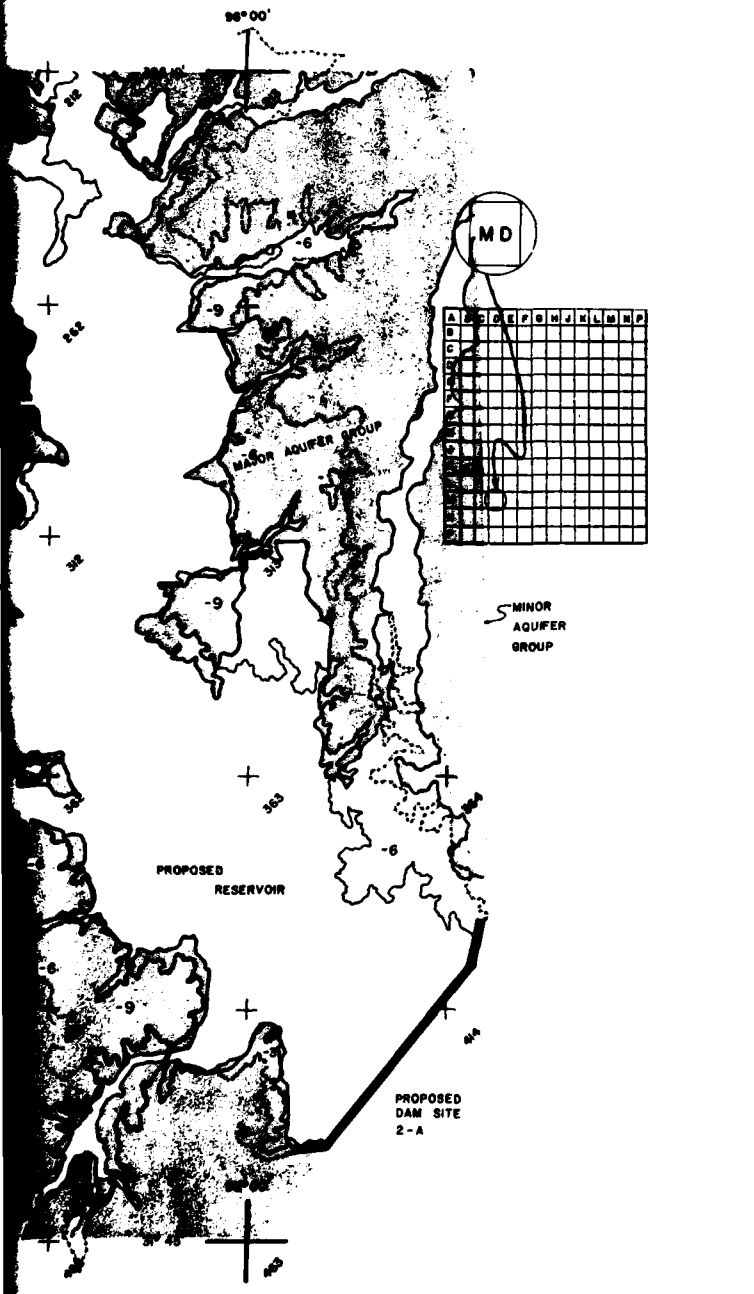
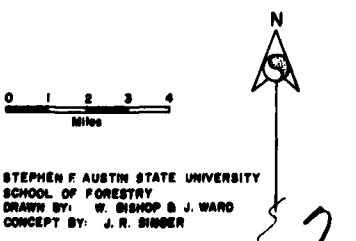
SCHOOL OF FORESTR
DRAWN BY W
CONCEPT BY J. R.

PLATE G-6

AREAS OF GROUNDWATER RECHARGE INHIBITING LAND USE SHIFTS: LOWER RESERVOIR REGION





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SCHOOL OF FORESTRY
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CONCEPT BY: J. R. SINGER

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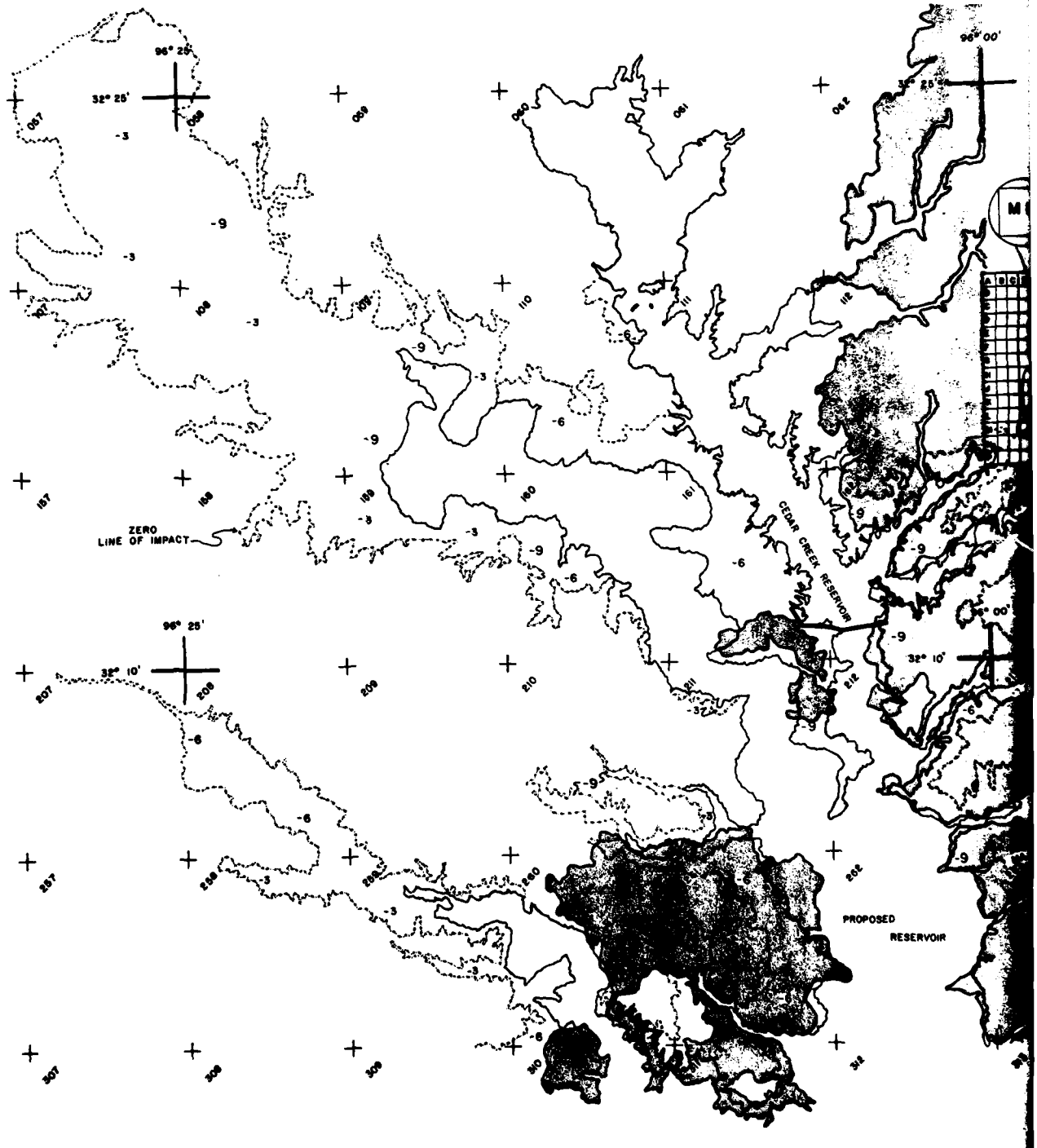

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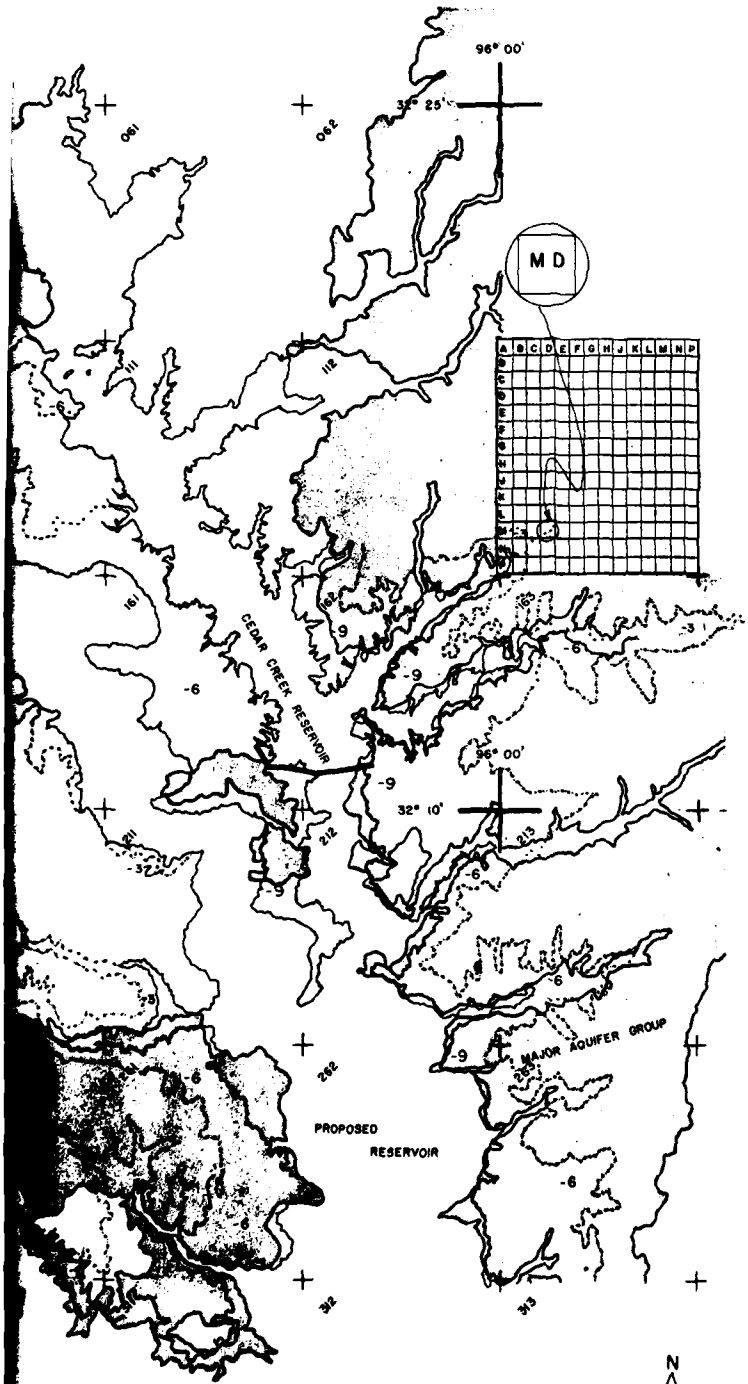
CONCEPT BY: J.R.

PLATE G-7

AREAS OF GROUNDWATER
RECHARGE INHIBITING
LAND USE SHIFTS:
UPPER RESERVOIR REGION



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SCHOOL OF FORESTRY
DRAWN BY: W. BISHOP & J. WARD
CONCEPT BY: J. R. SINGER

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systems. The aquifer consists of hydrologically connected water-bearing sand, sandstone, and gravel of the Wilcox Group and overlying Carrizo formation.

The Carrizo-Wilcox is exposed at the surface in most of the study area with the exception of the Corsicana, Powell, and Kerns vicinity. It is recharged by precipitation and streams crossing the outcrop region. The water-bearing beds dip beneath the land surface toward the southeast.

The potential for artificial recharge of the aquifer is planned to be evaluated on a statewide basis by the Texas Water Development Board. In the study area, the contribution that this outcrop region makes to recharge should be determined. The recharge alternative for the dispersal of water in the flood pool section of the reservoir should not go unexplored. Examples of some areas to be considered are map locations 311:CC, 312:GJ, and 261:EM.

Queen City

The Queen City, a minor aquifer outcrop, comprises a very small portion in the eastern part of the study area. It consists principally of sand and loosely cemented sandstone. It dips gently toward the southeast beneath younger geologic formations.

The aquifer supplies water for domestic, livestock, and municipal use. Yields of wells are generally low, few exceeding 400 gpm. Concentrations of dissolved solids are generally low. Land use shifts could adversely affect the quality of local wells producing from this aquifer.

Sparta

The Sparta aquifer underlies the Queen City. The beds of the Sparta formation, a minor aquifer outcrop, dip south and southeast from their small outcrop region in the eastern portion of the study area.

Throughout its entire extent, water from the Sparta supplies numerous towns, communities, State correction institutions, irrigated areas, and several industrial firms, as well as domestic and livestock purposes. Within the study area it supplies only domestic and livestock water. Ground water produced from the aquifer is generally low in concentrations of dissolved solids. Again, land use shifts should not create any pollution hazards or decrease in recharge potential.

SOILS

The soils in the study area range from excessively to very poorly drained. Drainage is one characteristic used in the Impact Functions Matrix (Table F-3). Plates G-8 and G-9 show the location of these characteristics. The drainage characteristics of soil associations are discussed in the following paragraphs.

Excessively drained areas. These are areas of deep, excessively drained, strongly acid sandy soils. An example is the Lakeland Association.

Excessively to well drained areas. These are areas of well drained, very slowly permeable, moderately deep, upland clay. An example is the Lakeland-Bowie Association.

Moderately well drained. This is an area of upland clay, very slowly permeable, calcareous, moderately well drained. An example is the Bell-Burleson Association. The Houston-Black occurs in this category but is very often imperfectly drained.

Well to moderately well drained. This is an area of deep, upland soil, well or moderately well drained. An example is the Trinity-Catalpa Association.

Imperfectly to somewhat poorly drained. This is an area of upland soils, very slowly permeable, fine

sand loam, varying in drainage due to mottling in subsoil. An example is the Tabor Association.

Poorly drained. This is an area of bottomland, gentle sloping flood plains. It is somewhat poorly drained and very slowly permeable. An example is the Navasota Association.

The examples of soil associations exhibiting these drainage characteristics are:

LAKELAND. These are deep, excessively drained, strongly acid, sandy soils. Typically, the surface layer is very dark grayish-brown or dark gray sand. Beneath this layer is a yellowish brown sand that extends to depths of 80 or more inches. Silt plus clay content in the 10 to 40 inch layer is to to 50 percent. These soils occur on smooth to strongly dissected landscapes. Slopes can range from about 0 to 30 percent.

TRINITY-CATALPA. A moderately well to well drained, very slowly permeable, calcareous, bottomland soil. It has very dark gary to black clay surfaces and subsoils. It developed from calcareous, clayey alluvium. It is on nearly level to gently sloping floodplains. Slopes are mainly less than 1 percent but can range up to 3 percent.

BELL-BURLESON. A moderately well drained, very slowly permeable, calcareous upland clay. It is very dark gray, highly plastic soil with very high shrink-swell properties. This soil developed from alkaline clays. Slopes are mainly less than 2 percent but range from 0 to 5 percent. The soil has repeating cycles each 10 to 24 feet, with virgin areas exhibiting a pit-knoll microrelief.

HOUSTON-BLACK. An imperfect to moderately well drained, very slowly permeable, deep upland clay. It is a very dark gray, highly plastic soil with very high shrink-swell properties. This soil developed from calcareous clays, marls, and shales, and in a few places, chalks. Slopes are mainly 1 to 3 percent, but range from 0 to 8 percent. The soil has repeating cycles each 10 to 24 feet, with virgin areas exhibiting a pit-knoll microrelief.

TABOR. These are moderately well drained, very slowly permeable, upland soils. They have grayish brown and very pale brown, fine sandy loam surfaces and brownish yellow, extremely hard, acid subsoils that are mottled with gray, light gray and yellowish red. The soils formed in acid to alkaline clays and sand clays interbedded with sandier materials. Slopes

range from 0 to 5 percent, but dominantly are less than 3 percent.

NAVOSOTA. The Navosota series consists of somewhat poorly drained, acid soils on floodplains. They have a dark grayish brown silty clay loam surface layer and a grayish brown silty clay subsoil. Slopes range from 0 to 3 percent.

WETLANDS

In areas of poorly drained soil the presence of the reservoir will cause increases in the water volume of the soil and an occasional backing up or flooding of the area. This is a natural hydrological phenomenon thay may be classified as an inhibiting factor to influence land uses by man. However, from an environmental perspective, wetlands can be viewed as low intensity land uses for man, which may be a high intensity land use for other environmental components. They are also a guiding factor to concentrate high intensity land uses of man on areas that would not require a high overhead maintenance cost.

The increase in water volume in most of these areas will be of a fluctuating nature thus requiring some consideration for a reorientation of the present land use. The present marsh and swamps will become larger especially if fed by a perennial stream. Whence a somewhat boggy condition restricting agricultural activity, now a swamp

or marsh will be formed.

This will be true for Soil Capability Classes II "w" and III "w". The areas in which this occurs can be seen on Plates G-8 and G-9 in relation to the soil drainage capabilities set forth in Table G-4 and displayed on Plates G-14 and G-15 in the section on soil areas for land use adjustment. Examples of areas where swampy or marshy conditions may develop can be seen on Plates G-8 and G-9 in the vicinity of 109:GN; 211:KE; 361:PA.

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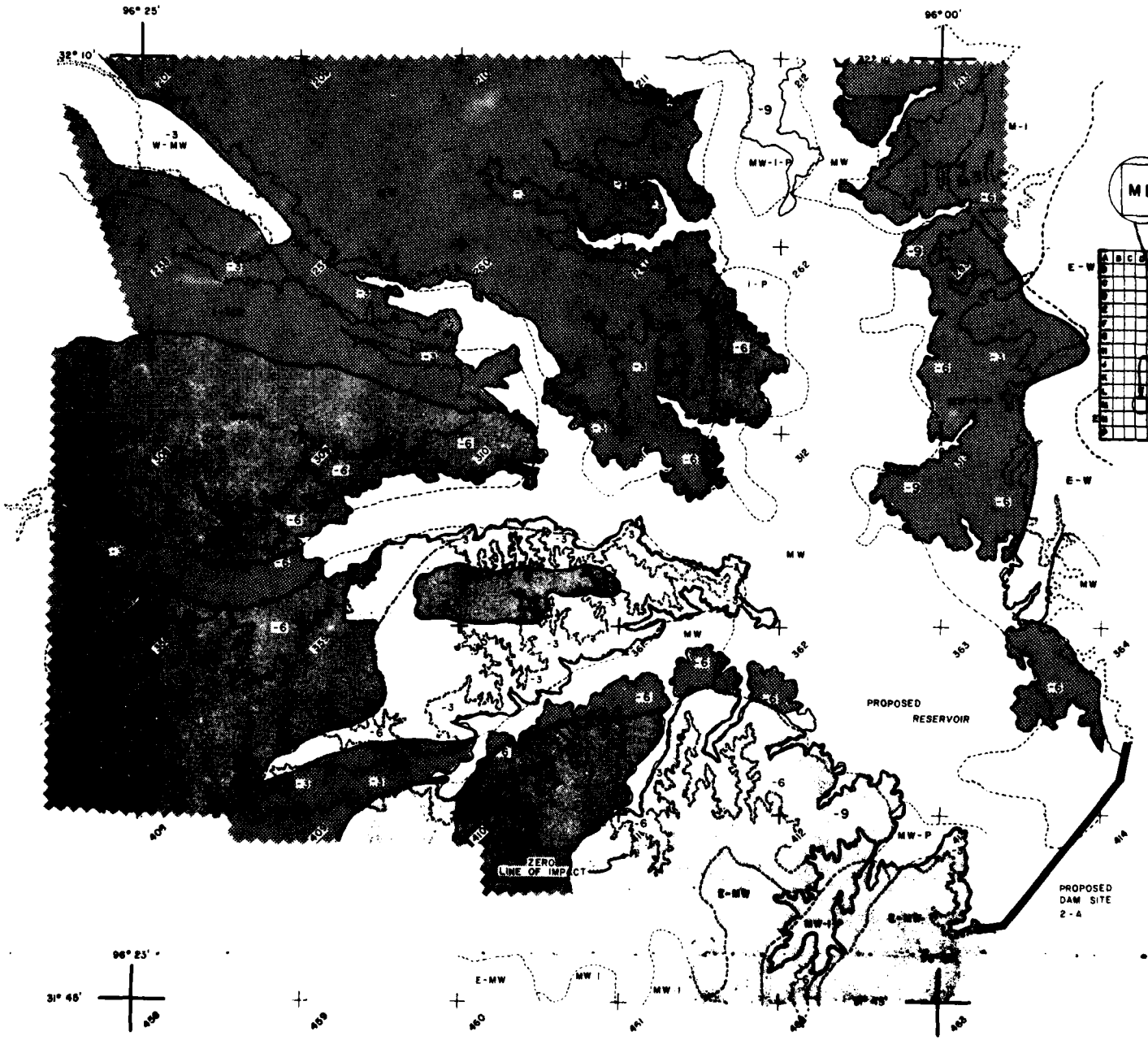

SOIL CAPABILITY CLASS II$_s$, $_w$, & $_e$

SOIL CAPABILITY CLASS III$_s$, $_w$, & $_e$

SOIL CAPABILITY CLASS IV$_s$

SOIL CAPABILITY CLASS IV$_s$, V$_s$, & VI$_s$

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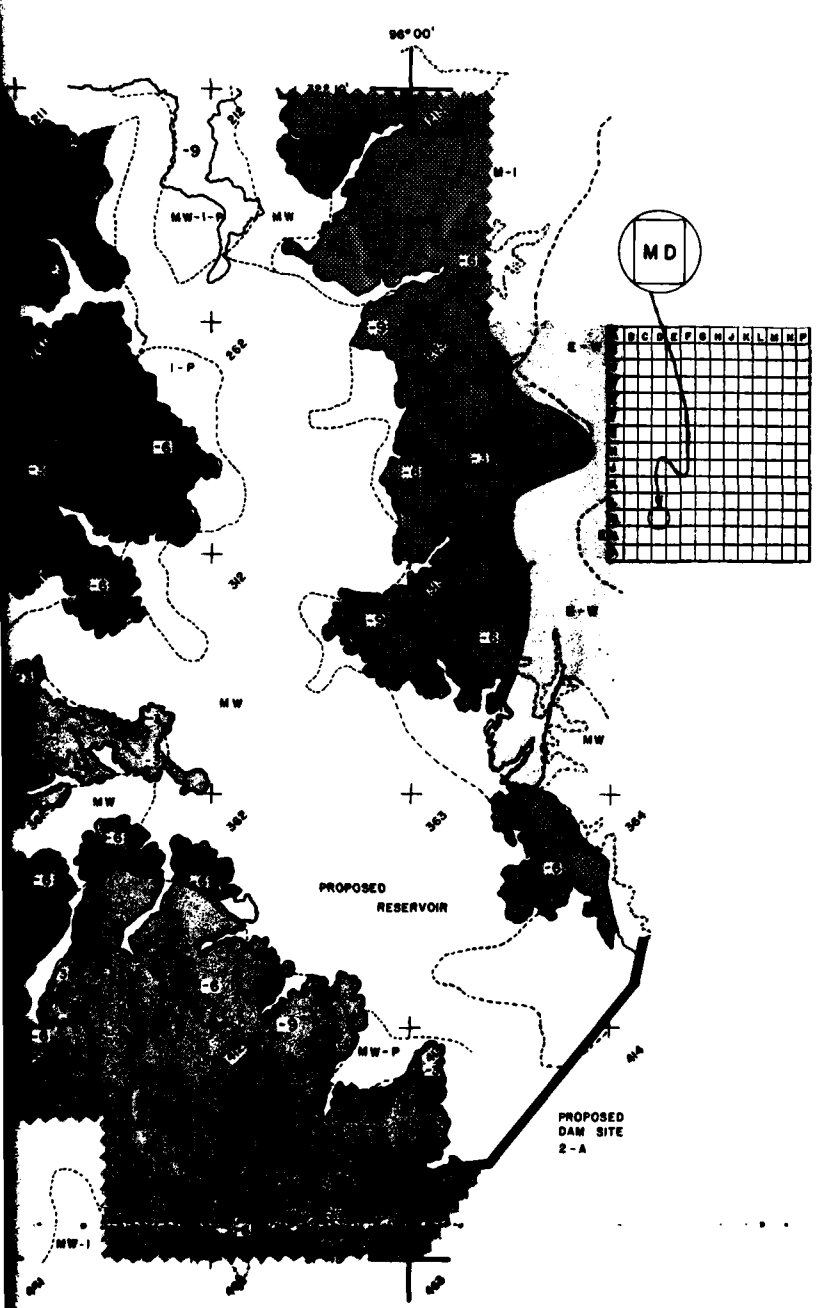
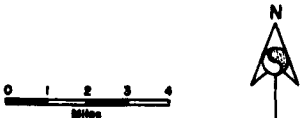
STEPHEN F AUST
SCHOOL OF FOR
DRAWN BY: W.
CONCEPT BY: J.

PLATE G-8

SOIL FACTORS INHIBITING LAND USE SHIFTS: LOWER RESERVOIR REGION





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DRAWN BY: W. BISHOP & J. WARD
CONCEPT BY: J. R. SINGER

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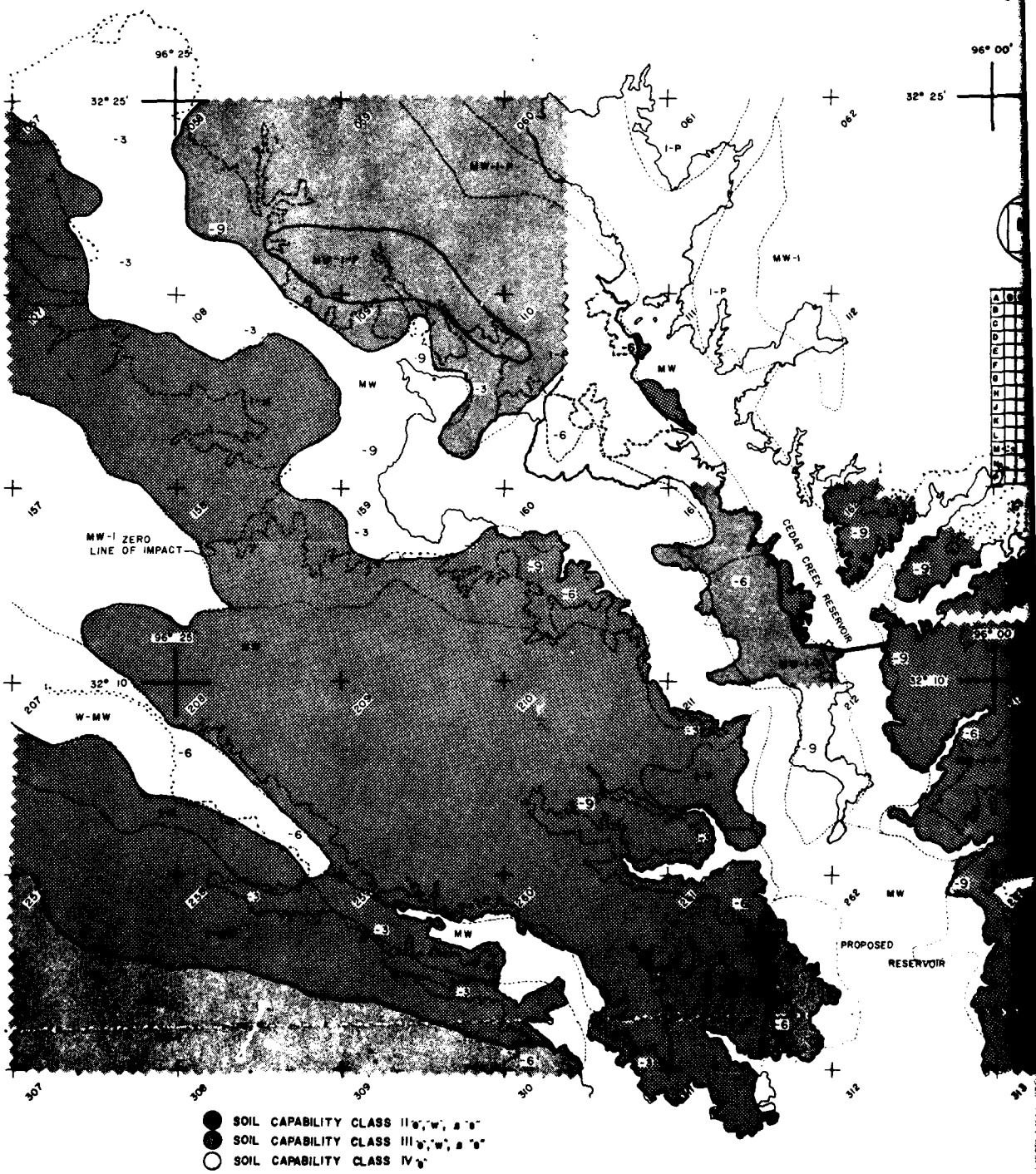

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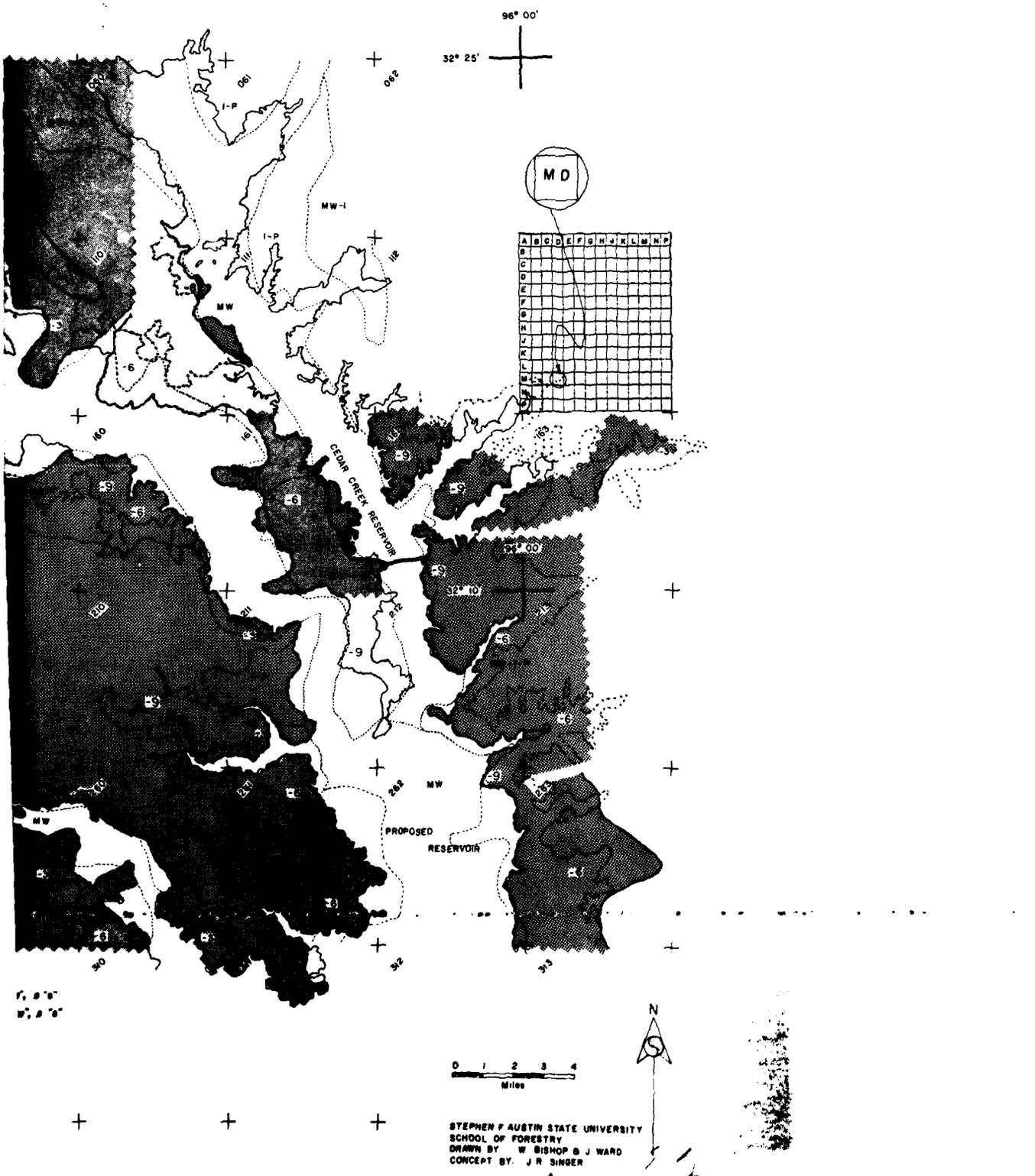
SCHOOL OF FORESTR
DRAWN BY W BIS
CONCEPT BY J R

PLATE G-9

SOIL FACTORS INHIBITING LAND USE SHIFTS: UPPER RESERVOIR REGION



EFFECTS OF IMPOUNDMENT ON LAND USE SHIFTS

As the Tennessee Colony Reservoir begins to fill and the land is inundated, there will be certain pressures created for land use shifts. The following is a discussion concerning the various major land uses and predicted necessary shifts guided by environmental factors that will influence these shifts as discussed in the previous section.

AGRICULTURE, FORESTS AND RECREATION

Agriculture

The first land use to be influenced is agriculture. Grazing, a major agricultural land use, obviously must shift from the inundated area. The water table will also rise closer to the surface of those pastures located on the terraces above the reservoir's water level. Where this water table rises too close to the surface of the pasture, grazing must be handled in such a manner to prevent erosion from overgrazing on the moist soil and/or pollution of the reservoir's water quality by surface runoff. Forested filter strips between range and reservoir boundary should be developed as a land use for water quality control and quail habitat. High intensity

grazing should be encouraged on those pastures which lie over the topography break above the reservoir to prevent the above conditions from occuring.

On some terrace pastures leading to upland slopes, the rising water table will provide sufficient ground moisture to enhance establishment of improved pasture. More water wells could be drilled for the residents of the area, and increased ground water could improve ground cover on unimproved pastures.

The quality and fertility of the bottomlands is approximately four times that of the upland soils, i.e., one acre of bottomland is approximately four times as productive as one acre of upland pasture. This productivity ratio of 4:1 should be considered when compensation is made for inundated bottomland range and when pasture land use shifts occur.

In the areas located above the terraces, the present agricultural land use is the planting and farming of row crops, such as cotton and feed vrops. Thus, little row crop land will be abandoned due to inundation, but may receive pressure for conversion to pasture. In row crop areas (such as areas 209, 210, 260; the blank areas outside of forests shown on Plates G-10 and G-11) some measures will also be necessary to prevent fertilizer pollution of the reservoir from excessive surface runoff.

At some locations, a rising water table will also have an effect upon this land use type. In some areas, the rise will be so high that it causes excessively wet ground conditions. Some examples of these areas, with map locations, are given in the section on environmental impact analysis. This land will be unsuitable for farming and may be converted to another land use. On some areas outside the excessive water flux impact zones -- depending on precipitation and soil permeability -- the water table will rise to a level that will add the needed moisture to the soil allowing higher quality and quantity row and feed crop yields.

Forests and Recreation

The impoundment will create great quantities of recreation potential and enhance existing hunting and fishing activity. Almost all hunting will occur on or adjacent to forested areas. The highest value of the forest lands may well be in providing a service base for recreational hunting. The development of this potential will serve to ease the volume of use on other reservoirs and recreation sites existing throughout East Texas and West Louisiana by attracting recreationists from the population centers in this region. These users will have available the same or similar facilities on Tennessee Colony which other areas offer but

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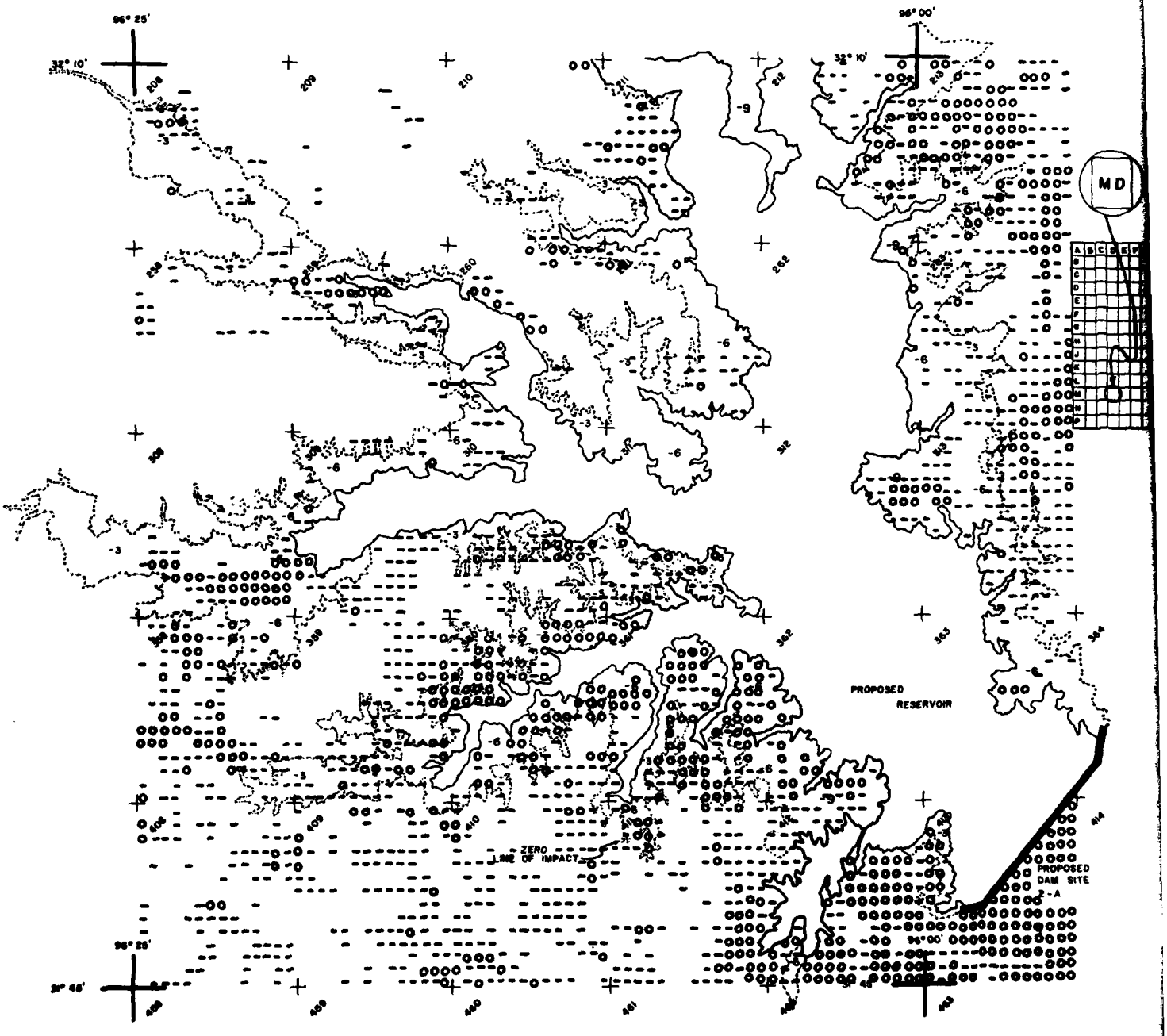

STEPHEN F AUSTIN ST
SCHOOL OF FORESTRY
DRAWN BY: W
CONCEPT BY: J. R.

PLATE G-10

EFFECTS OF IMPOUNDMENT
ON FORESTRY
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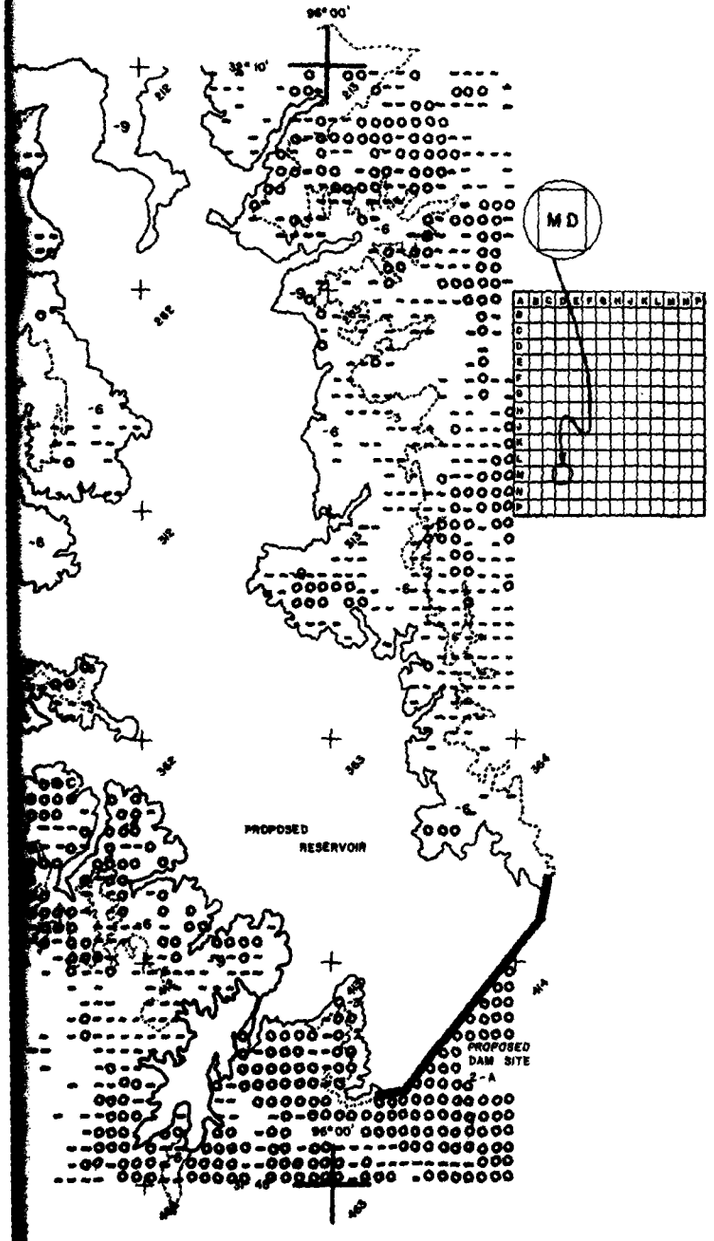

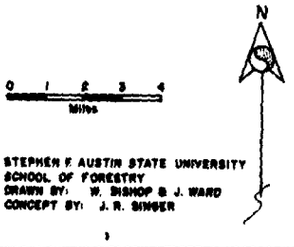

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SCHOOL OF FORESTRY
DRAWN BY: W. BISHOP & J. WARD
CONCEPT BY: J. R. SINGER

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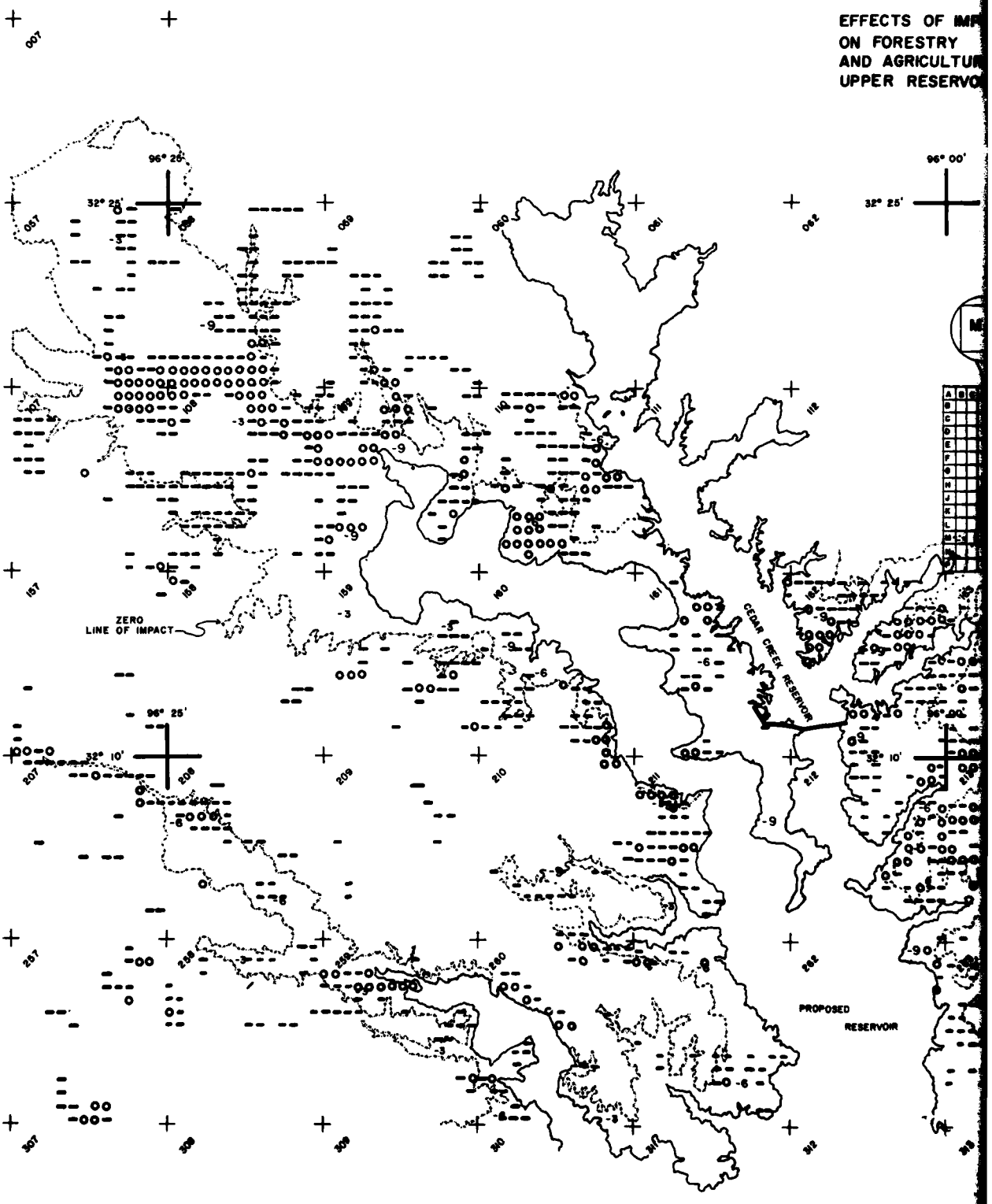

STEPHEN F AUSTIN
SCHOOL OF FOREST
DRAWN BY W. GR
CONCEPT BY: J.R.

PLATE G-II

EFFECTS OF IMPOUNDMENT
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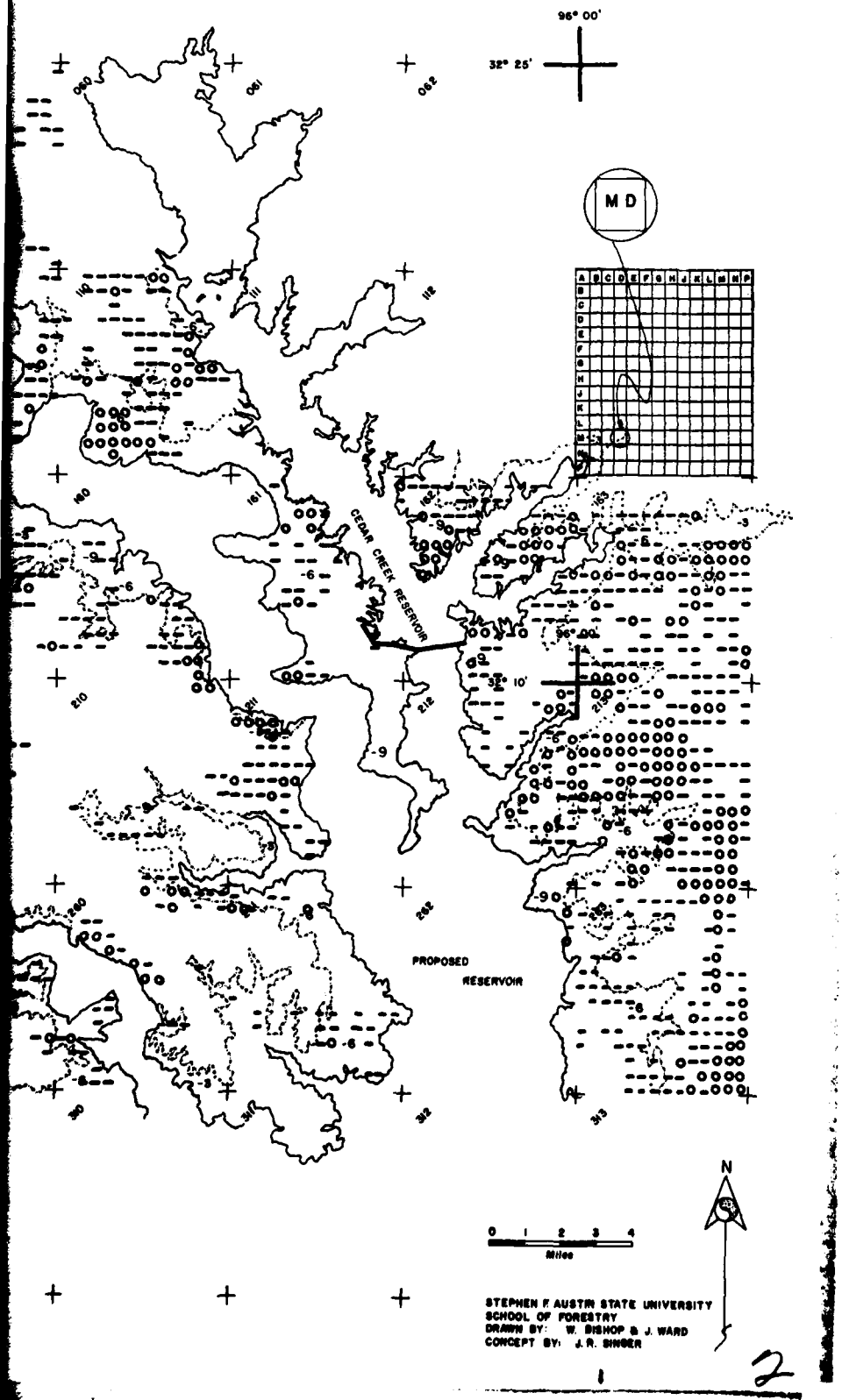
AND AGRICULTURE:
UPPER RESERVOIR REGION



at a possibly more convenient location. Because of regional accessibility via interstate highway 45, the area can expect high recreational demand from the metropolitan areas of Fort Worth, Dallas, and Houston.

Various types of recreation could be developed, including overnight and day-use picnicking and comping areas. These developments could be located in forested and partially forested areas adjoining the reservoir, depending upon soil and geological qualities and capabilities, and the type of development needed. Hiking trails around the reservoir shoreline are feasible.

Areas suitable for fishing will be located in the upper reaches and fingers of the reservoir. Some hardwoods in these areas should be left so that they may be submerged in order to provide better fish habitat. Fishing zones must not confilict with commercial use of the reservoir by barge traffic.

Hunting around the reservoir could occur in both clear fields and in forested areas. More intense hunting will occur on the forest fringes. These areas can be easily identified on Plates G-10 and G-11. Since the land around the reservoir is privately owned, except for the easement area managed by the Corps of Engineers, hunting will be done through agreement with land owners or by the owners themselves. Any development of recreation sites must consider

possible conflicts with recreational hunting. In fact, it would be well to develop a reconnaissance level recreation plan, based on 92.72 acre blocks, and providing alternative recreation land-use choices that are in harmony with the environment, so that private land owners may choose what they wish to develop on their land. Such a plan could show a hierarchy of recreation function for the entire reservoir region.

Migratory waterfowl hunting on the reservoir will be done primarily in the vicinity of those areas suitable for fishing. Conflicts here are possible, but are minimal due to seasonal differences. This hunting must also be provided in a manner to avoid conflict with commercial barge and shipping traffic.

Water-based recreation, swimming, boating and water skiing, can be developed in conjunction with the day-use recreation sites around the reservoir. This type of use demands large, open water areas, and must, therefore, be guided to avoid conflict with commercial shipping traffic on the reservoir. Swimming areas can be built in the developed areas, but must be separate from the boating and water skiing areas for safety and aesthetic reasons.

POPULATION CENTERS

Most of the population centers surrounding the reser-

voir will expand commercially, economically, and possibly in population. Some of these include Corsicana, Kernes, Richland, and Streetman. This expansion will occur due to the recreational use and commercial (barge traffic) development of the proposed Tennessee Colony Reservoir. These centers hold the potential to supply goods and services to increased tourism and non-agricultural commercial demands related to the proposed reservoir. Industrial transportation through these areas to the (potential) loading docks for barge traffic will also contribute to this increased economy.

Although the beneficial effects upon the surrounding reservoir area may be many, there are certain effects upon some communities that must be considered. Two communities directly in zones of extreme water flux are Malakoff (population, 2,300) and Trinidad (population,],250). They both lie within a minus nine (-9) impact zone, (Plates G-12 and G-13). The characteristics of these areas are described below.

The present community of Trinidad, Texas lies in an area that will become a long narrow peninsula bordered on both sides by the water of the proposed reservoir. A large part of the community will become submerged, covering many homes and several cemeteries. The rest of the community will become indirectly effected. A rising water table will create a swampy condition in this area. This condition

will make the area less desirable than present for community living.

The soils of the area are poorly drained and susceptable to erosion with the surrounding area being partially forested. The topography of the area away from the shore line is relatively flat (under 2 1/2) and this along with the poor soil drainage increases the potential damages from a rising water table.

The present land use of the area is farming and grazing with a few industries. This land use will have to be greatly altered as a result of the reservoir. The soil will become more moist and soggy after any rain and will remain moist and soggy for longer periods of time. Thus, severe swampy conditions will prevail preventing the land from being used for any high intensity activity.

The overall effect of the reservoir upon the Trinidad area will result in the direct and indirect loss of inhabitable home sites, businesses, industry, and land base for high intensity use. This will have a severe detrimental effect upon the life of this community and these considerations must be taken into account and weighed against the overall importance of the reservoir.

The second community to be considered in the minus nine (-9) impact zone is Malakoff, Texas. Although this

community has the same rating (-9) as Trinidad, the effects upon the community itself will not be as severe. One reason for this is that this community will not be directly covered by water and the economy can develop demands by goods and services created by the reservoir. However, the community should not expand toward the reservoir, but rather eastward out of the impact zone. Should the community expand westward with high intensity land uses, increased overhead costs for establishment and maintenance of the land use will be increased.

The soils are poorly drained and susceptible to erosion with the area being partially forested. The major land use of the area is farming and grazing and it is this rather than the community that will be affected. These uses will have to be altered to land uses that complement the rising water table. Areas along the reservoir that are utilized for agriculture will have to be shifted to upslope positions to prevent erosion of the soil banks and pollution from surface flow into the reservoir.

Growth Directions of Population Centers

Almost all of the communities within the proposed Tennessee Colony Reservoir area will be either directly or indirectly affected by the construction of the reservoir. The reservoir will become an economic generator to most of the

communities through their development potential to provide goods and services for the new commercial and recreational activity. As a result of this economic effort, most of these communities will grow in both economy, and population. This population increase will then cause an expansion of the city. It is the direction of this expansion that will be considered here in this land use study. An input-output analysis of interindustry flows of raw materials, intermediate products, and business services will soon be needed for this area.

To determine the future directional growth of these communities, many factors must be considered. The location of each community must be viewed in relation to environmental factors characteristic of that particular area. Some of these factors are major and minor aquifers, soil type and drainage, present and future land use, reservoir boundary, water flux (impact zone) boundary, and transportation network.

A brief description of each community is given below in numerical order of impact zone beginning with those in the highest zones. Within each zone, the larger population centers are discussed first.

Malakoff, Texas (population 2,300). This community is bordered on three sides by a minus nine (-9) impact zone. The main industry in the area is agriculture with

some cattle ranching but the community has already started tourist trade development due to Cedar Creek Reservoir. The soil drainage of the area is imperfect to poor. Some swampy conditions will prevail after the reservoir is filled. For any future expansion, the community must either go to a multistory community or expand northeast. No expansion should be made into the impact zone. The community is located on a major aquifer outcropping. Ground water recharge and factors of environmental geology must be considered in any areal expansion of this city or its airport. (Compare Plate G-7 and G-13).

Trinidad, Texas (population 1,250). The population of this community may need to be relocated. The present community lies within a minus nine (-9) area and is bordered on three sides by the proposed reservoir. Part of the town is within the reservoir boundary.

Any expansion of these communities toward the proposed reservoir boundary will result in adverse effects not only on the community, but also on the water quality of the reservoir. This situation should be considered before any future expansion is undertaken.

Richland, Texas (population 287). This community is bordered on the north and east by a minus six (-6) impact zone. The soil drainage is moderately well to poor. The major industry of the area is farming with some cattle

ranching.

Richland has the potential for growth in population and economy due to the reservoir and its location on interstate highway 45. It must, however, expand to the southwest or southeast along the highway to prevent any extension into the impact zone. It is not located on an aquifer outcrop.

Streetman, Texas (population 221). This community is bordered on the south and north by a minus six (-6) impact zone. Soil drainage of the area is moderately well to poor. This is an agricultural community with some potential development for tourism that may occur on the reservoir, east of the town. The community should expand to the southwest and northeast to prevent any development into the impact zone. Any development to the northeast will be on a major aquifer recharge area. Here, as in the case of Malakoff, factors of environmental geology must be considered in depth (compare Plates G-6 and G-12).

Corsicana, Texas (population 22,520). This community is the closest large population center to the reservoir on the west side and has the potential for the greatest economic development on that side of the reservoir. Corsicana is bordered on its east side by a minus three (-3) impact zone and any expansion in this direction

should be limited to low intensity land use. This area is excessive to well drained causing no negative impact on the community itself. Corsicana is not located on a ground water recharge area. The airports here and at Athens have the potential to provide air service to the region in its initial stages of development.

Kerens, Texas (population 1,865). This community is bordered on the south by a minus three (-3) impact area that has moderately well drained soils. The major industry of the area is agriculture. The community should, however, increase in economy and population due to the construction of the proposed reservoir. Their direction of growth should be north to northwest thus preventing any extension into the impact areas. Kerens is not located in an aquifer outcrop area.

Powell, Texas (population 225). This community is bordered on the south, southwest, and west by a minus three (-3) impact zone that has moderately drained soils. The only industry in the area is agriculture. This community could expand to the north, east, and southeast with limited or no expansion into the impact zones.

INDUSTRY

The industry of the proposed Tennessee Colony

Reservoir area consists of mainly agriculture with cattle being the major emphasis. There are many small ranchers who own from 50 to 4,000 acres within this area. However, there are some who own much more than this, those being the Texas and Southwestern Cattlemen's Accociation members. This industry will be both directly and indirectly effected by the reservoir as discussed in the section on agriculture.

There are some other large industries within this area that will also be affected by the construction of the reservoir. Two of these are th NIPAK Fertilizer Plant (a subsidiary of Lone Star Gas Company) located at 211:DM (Plate G-13) and the Texas Power and Light Company located at 211:LP (Plate G-13). Both are located in or near the Trinidad area and both contribute greatly to the economy of this community. Both will be directly affected by the proposed reservoir in that they will both be inundated. Thus they will have to relocate resulting in a short range decrease of the base of employment in this immediate area. The population appears to be highly mobile; they would undoubtedly commute to the new location.

Scattered throughout the reservoir area are several oil fields. Some of the producing wells will be submerged by the rising water of the reservoir while others are located within impact zones. Careful precautions

must be taken to insure that these are adequately capped to prevent leakage. Depending on local soil conditions, other well sites will become marshy and swampy. This must be considered in well maintenance and prevention of spills. Another aspect of oil industry related pollution to be considered is the increased saline content of streams flowing into the reservoir due to runoff from drilling operations.

The Texas Power and Light Company also has a lignite powered generating plant northeast of Fairfield. This plant has much of its strip mining activities within a minus nine (-9) impact area. This will decrease the potential of lignite excavation if these deposits are not worked immediately. These reclaimed lands, located on the reservoir edge, must be considered in developing any detailed land use plans for the area.

ACCESSIBILITY SHIFTS

New Accessibility System

A large part of the road network, consisting of some primary as well as secondary and tertiary roads, will become submerged when the reservoir is completed. This creates need for a new accessibility system. Some of the major high ways to be cut by inundation in this area are U.S. 287 and S.H. 488. Perhaps these highways could lead

to recreational nodes on the reservoir boundary. However, the intensity of land use in these recreational nodes must conform to the carrying capacity of the environment since they terminate in minus six (-6) and minus nine (-9) impact areas (Plate G-12, location 310:CH, 312:GM, 361:CJ). Some of the surrounding highways leading into and through the study area are highways S.H. 31, I 45, U.S. 75, U.S. 175 and S.H. 274.

The major railways within the region are: Chicago, Rock Island, and Pacific Railway; Southern Pacific Railway; Fort Worth and Denver Railway; and St. Louis Southwestern Railway. Only the St. Louis Southwestern Railway will become submerged and alterations in route or construction of a bridge must be considered.

These railways may have an increase in traffic due to the possible complementarity with barge traffic. They could be moving material from the reservoir into the surrounding cities and bringing goods back to the canal for shipping. Railway loading stations and relay stations along the reservoir edge will no doubt be constructed to accommodate the complementarity possible between barge and railway function.

Excess Accessibility

There are many unimproved and improved, secondary and tertiary roads throughout the proposed Tennessee Colony Reservoir area, as well as the improved, primary highways. The present road network throughout this area was constructed without the reservoir-land-use concept in mind. Thus, when the reservoir is constructed--creating the new accessibility system--a possible adverse condition will arise and must be considered. This pertains to the possibility of excessive accessibility in and through the impact zones. Excessive accessibility is defined as public accessibility to an impact area that is greater than the area can absorb, thus causing an increased negative impact. (To locate specific areas where this may occur refer to the streets and low-cost roads comments in the section on soil areas for land use adjustment.) Erosion and increased litter will result from excessive accessibility to the general public.

The road network in these areas should be critically reviewed to determine the extent of this problem and ways to mitigate it. Gates to these access roads could be constructed to prevent or reduce this problem, while at the same time allowing access by the local residents.

PLATE

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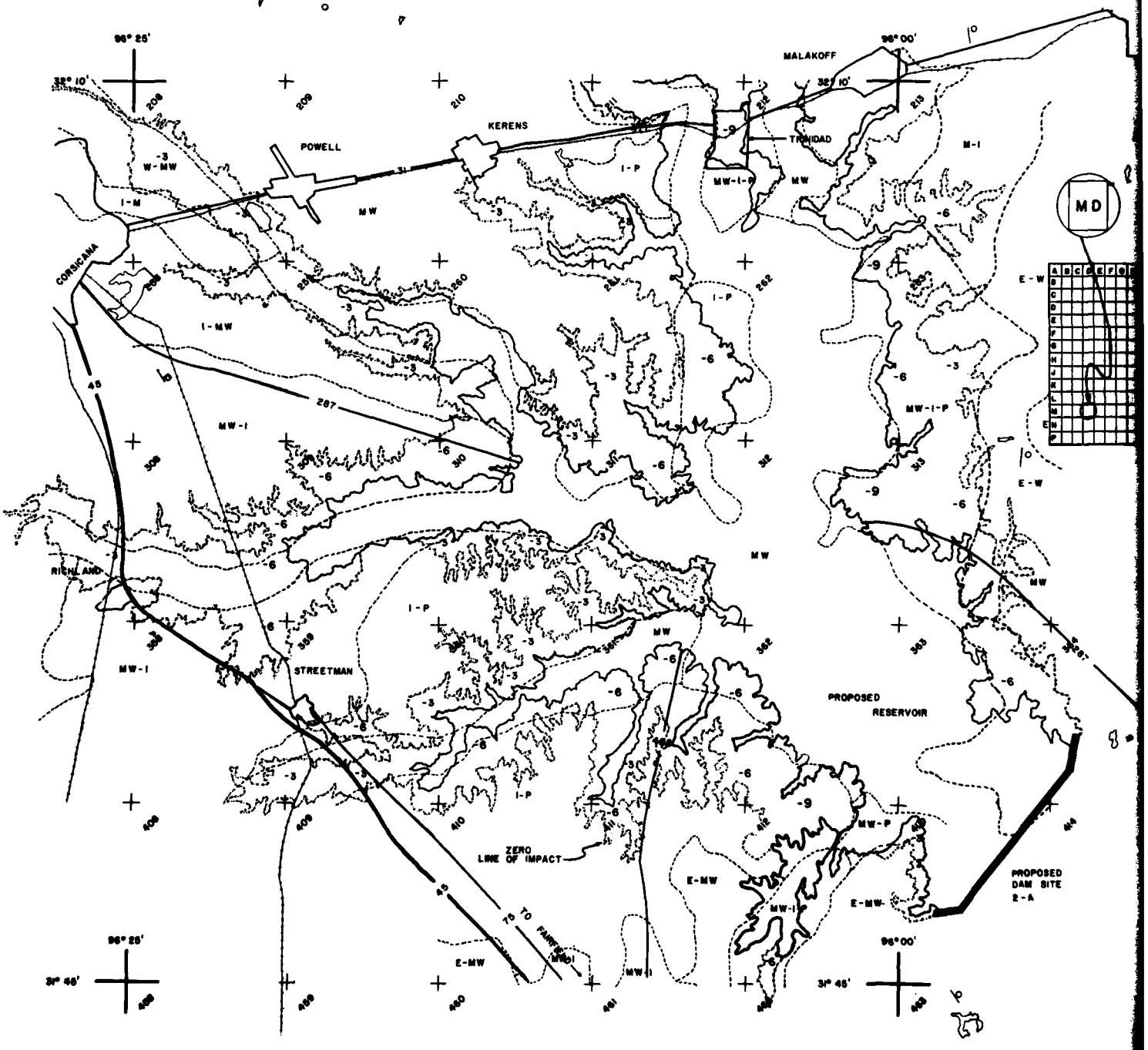
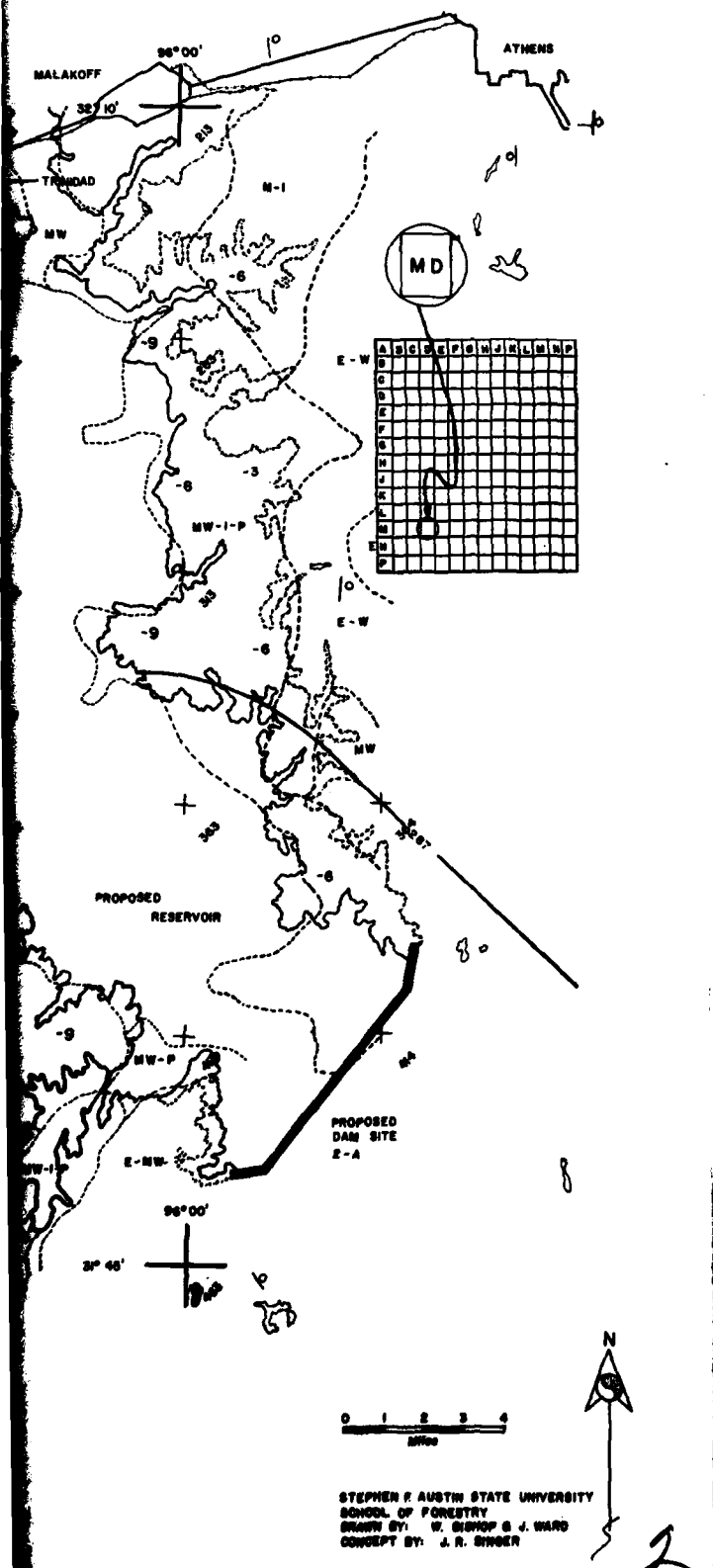


RAILROADS ←——— AIRPORTS

STEPHEN F AUSTIN ST
SCHOOL OF FORESTR
DRAWN BY: W. GIB
CONCEPT BY: J. R.

PLATE G-12

EFFECTS OF IMPOUNDMENT ON GROWTH OF POPULATION CENTERS: LOWER RESERVOIR REGION



PLATE

EFFECTS OF IMPO
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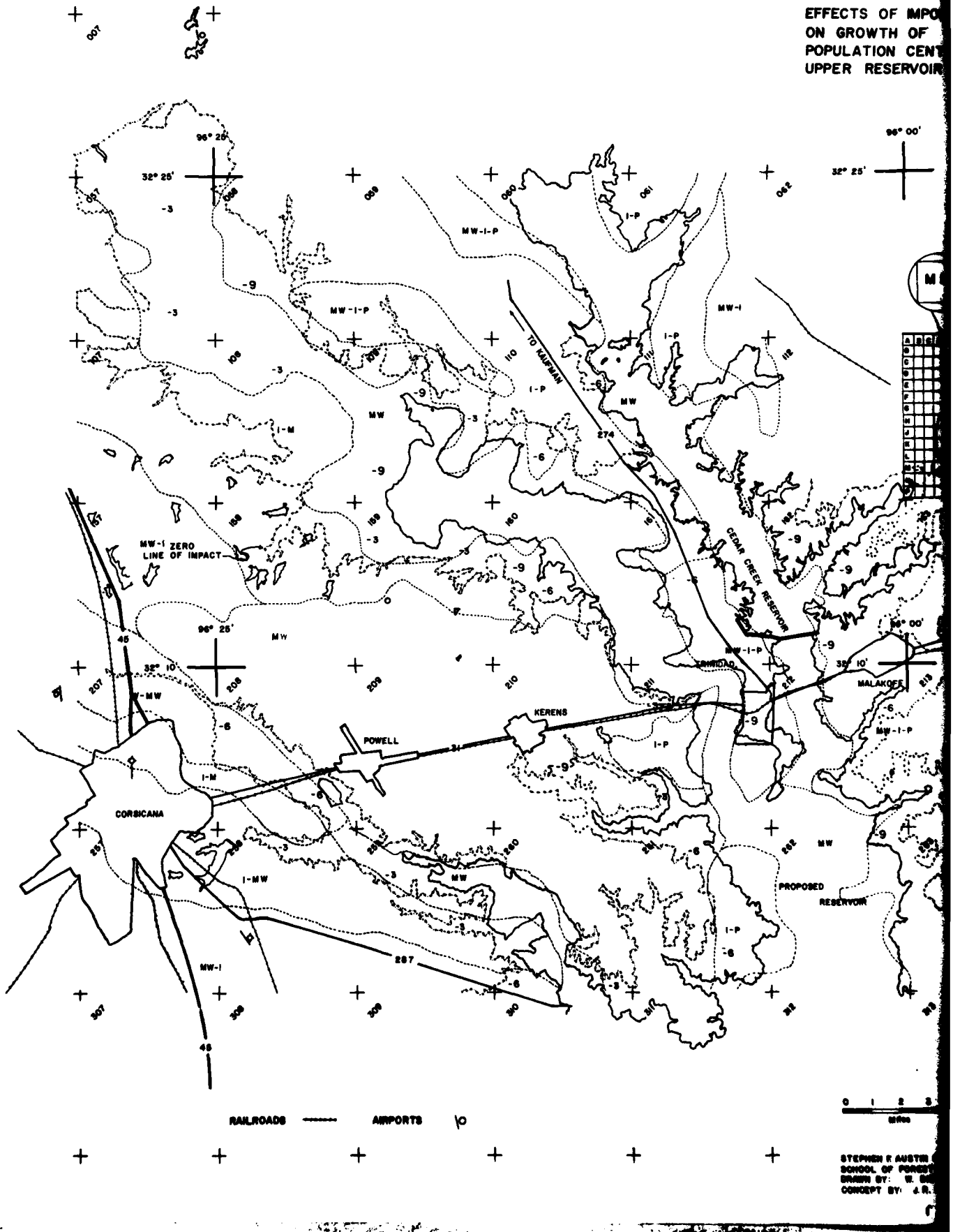
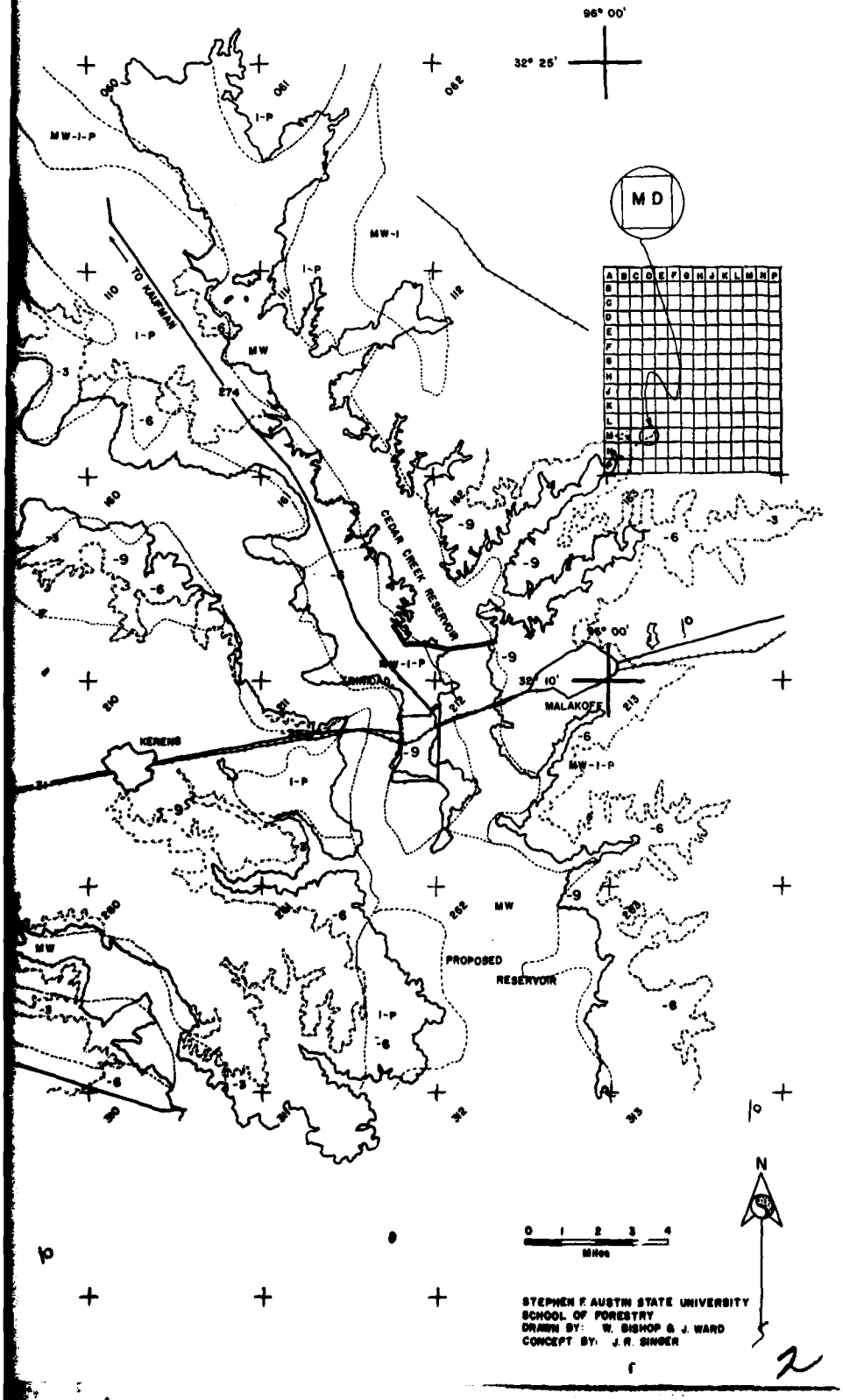


PLATE G-13

EFFECTS OF IMPOUNDMENT ON GROWTH OF POPULATION CENTERS: UPPER RESERVOIR REGION



STEPHEN F AUSTIN STATE UNIVERSITY
SCHOOL OF FORESTRY
DRAWN BY: W. BISHOP & J. WARD
CONCEPT BY: J. R. SINGER

THE BASIS FOR A CONCEPT LAND USE PLAN

Soil capability classification is the basis for the concept land use plan. It is the grouping of soils to show in broad categories the capability of the land for development and use based on ecological considerations. It is a classification based on soil limitations for an array of uses as well as the risk of damage and response to treatment. The soils are classified according to degree and kind of permanent limitation. This approach makes it possible to predict the behavior of the soils under any proposed land use. This is based upon past experience with similar soils and should be done at the comprehensive level (soil specialist liaison with agencies of various mission orientation) and at the project level by the soil specialist focusing on soils.

This reconnaissance level areawide soil suitability study identifies their physical, chemical, and biological properties. It interprets these properties for functional land use and locates the various soil associations geographically in the entire study area.

This land use function approach provides the concepts of best land use. It will aide in the formulation of local and regional goals and objectives, the preparation of local planning standards, the analysis of existing

local land use and plan synthesis, test and evaluation. Its use will aid materially in plan implementation (Bauer, 1966). The next step would be the preparation of site evaluation maps for particular site uses. This is of course outside of the scope of this study.

Several factors are not considered in the classification system. Major and generally expensive alterations that could be made in the slope, depth, or other characteristics of the soils are not considered. Possible but unlikely major reclamation projects are not dealt with in the general system. The classification does not apply to agricultural crops having special requirements such as rice and horticultural crops.

In the capability system, all kinds of soils are grouped at three levels. They are: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

The broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I.	Soils have few limitations that restrict their use.
Class II.	Soils have moderate limitations that reduce the choice of plants or require moderate conservation practices

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV. Soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife food and cover.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to aesthetic purposes.

Capability subclasses are soil groups within each class; they are designated by adding a small letter, "e", "w", "s", or "c" to the class numeral, for example, II"e". The letter "e" shows that the main limitation is risk of erosion unless close-growing plant cover is maintained. A "w" shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness

can be partly corrected by artificial drainage). An "s" shows that the soil is limited mainly because it is shallow, droughty, or stony. A "c" shows that the chief limitation is climate that is too cold or too dry.

In Class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by "w", "s", and "c" because the soils in Class V are subject to little or no erosion, though they have other limitations that restrict their use. Soil capability classes present in the area of study are shown in Plates G-14 and G-15.

SOIL AREAS FOR LAND USE ADJUSTMENT

This section is designed to show what the land use alternatives are on any specific soil type. It provides a reconnaissance level basis for private landowners to choose. Land use capabilities in the region fall into four major categories. They are shown from top to bottom in the legend on Plates G-14 and G-15.

SOIL CAPABILITY CLASS II

The first category is comprised of Soil Capability Class II with subclasses "e", "w", and "s". These soils have moderate limitations that reduce the choice of plants or require moderate conservation practices. The letters "e" and "w" subscripts stand for erosion and water hazards. Erosion is strictly the main limiation unless close-grown plant cover is maintained. The "w" subscript indicates that water in or on the soil interfers with plant growth or cultivation. The principal soils in this category are the Kaufman and Sawyer series. See Table G-4 for drainage description and map location on Plates G-14 and G-15.

One proceeds to outline, for example, MW--the KAUFMAN-TRINITY and KAUFMAN--in quadrangle numbers 358,

359, 360, 361, 059, 060, 061, 110, 111, 161, 162, and 212 as well as the MI--SAWYER-SUSQUEHANNA--in quadrangle numbers 213 and 263. Now one outlines, on the map, Soil Capability Class II within these MW and MI regions. We have now identified, in concept, the capability of the land for development and use based on ecological considerations. On-site adjustments will be necessary depending on the relation of a land unit to an impact zone. This procedure can be used in every category. A description of the conceptual land use follows.

The principal land use in this area should be woodlands. The primary species are cotton wood (Populus deltoides), sweetgum (Liquidambar styraciflua) and water oak (Quercus nigra). The major tree species to plant on the Kaufman series is cottonwood. On the Sawyer series, the primary species are: slash pine (Pinus elliottii), longleaf pine (Pinus palusatris) and loblolly pine (Pinus taeda). The major species to plant on the Sawyer series are slash pine and loblolly pine.

Alternate land uses on this first category are as follows from best suitability to worst suitability. The first alternative land use is wildlife on the Kaufman and Sawyer series, with some range on the Ellis series.

On the Kaufman series the land use concepts from most to least desirable are recreation, range and

pasture. Major soil features effecting other selected uses are:

Highway location--severe-high clay content, subject to overflow

Pond reservoir area--slight

Pond embankments--moderate - fair slope stability

Excavated ponds (runoff fed)--slight

Corrosivity, uncoated steel--very high - somewhat poorly drained; clay texture

Corrosivity, concrete--low to moderate

Foundations for low buildings--severe - subject to overflow, very high shrink-swell potential

Septic tank filter fields--severe - very slowly permeable

Sewage lagoons--slight when protected from overflow and severe when subject to overflow

Streets and low-cost roads--severe - subject to overflow; poor traffic supporting capacity

Light industries--severe - subject to overflow; very high shrink-swell potential

On the Sawyer series the land use concepts from most to least desirable are wildlife, recreation and pasture. Major soil features effecting other selected uses are:

Highway location--moderate - traffic-supporting capacity, wetness

Pond reservoir areas--slight

Pond embankments--moderate - fair slope stability, medium to high compressibility

Excavated ponds (runoff fed)--slight

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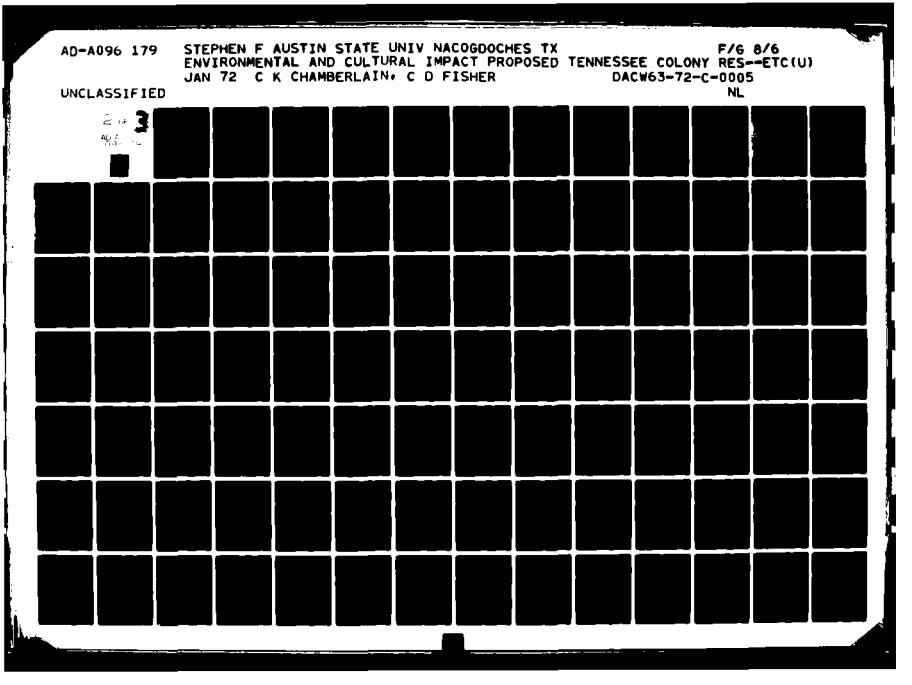


Excavated ponds (aquifer fed)--moderate - depth to permanert dry season water table

Corrosivity, uncoated steel--high - texture, drainage, acidity

Corrosivity, concrete--high - acidity

Foundations for low buildings--moderate to high - unified soil group, wetness, shrink-swell

Septic tank filter fields--severe - permeability

Sewage lagoons--slight - 0-2% slope
--moderate - slopes greater than 2%

Streets and low-cost roads--moderate to high - traffic-supporting capacity, wetness, shrink-swell

Light industries--moderate to high - bearing strength, wetness, corrosion-uncoated steel, shrink-swell

SOIL CAPABILITY CLASS III

The second category is comprised of Soil Capability Class III with subclasses "e", "w", and "s". These are the soils that have severe limitations that reduce the choice of plants, and require special conservation practices or both. For the definition of "e" and "w" see above. An "s" shows that soil is limited mainly because it is shallow, droughty, or stony. The principle soils in this category are: the Axtell, Crockett, Tabor, Wilson and Navasota series.

The principal land use on the Axtell anc Crockett series should be range with post oak (Quercus stellata)

and blackjack oak (Quercus marilandica). The Tabor series is best suited for wildlife as is the Wilson and Navasota series.

The principal alternate conceptual land uses from best-suited to least-suited on the Axtell Series are wildlife, pasture, woodland (with post oak, Quercus stellata), and recreation. Major soil features effecting other selected uses are:

Highway location--severe - shrink-swell potential
traffic supporting capacity

Pond reservoir areas--none to slight

Pond embankments--moderate - stability

Excavated ponds (runoff fed)--slight

Corrosivity, uncoated steel--high - clay texture

Corrosivity, concrete--moderate - texture and reaction

Foundations for low buildings--severe - shrink-swell potential

Septic tank filter fields--severe - permeability

Sewage lagoons--slight - 0-2% slopes
--moderate - 2-7% slopes
--severe - 7-12% slopes

Streets and low cost roads--severe - shrink-swell potential, traffic-supporting capacity

Light industries--severe - shrink-swell potential, corrosivity

The principal alternate conceptual land uses from best-suited to least-suited on the Crockett series are

wildlife, pasture, recreation, and woodland. Major soil features effecting other selected uses are:

Highway location--severe - shrink-swell potential, traffic-supporting capacity

Pond reservoir areas--none to slight

Pond embankments--moderate - stability, compressibility

Excavated ponds (runoff fed)--slight

Corrosivity, uncoated steel--high - clay texture

Corrosivity, concrete--low

Foundations for low buildings--severe - shrink-swell potential

Septic tank filter fields--severe - permeability

Sewage lagoons--slight - 0-2% slopes
--moderate - 2-7% slopes
--severe - 7-10% slopes

Streets and low-cost roads--severe - shrink-swell potential, traffic-supporting capacity

Light industries--severe - shrink-swell potential, corrosivity, uncoated steel

The principal alternate conceptual land uses from best-suited to least-suited on the Tabor series are range (with post oak, Quercus stellata, blackjack oak, Quercus marilandica), woodland (loblolly, Pinus taeda), recreation and pasture. Major soil features effecting other selected uses are:

Pond reservoir areas--none to slight

Pond embankments--moderate - slope stability

Excavated ponds (aquifer fed)--severe - depth to permanent dry season water table

Corrosivity, uncoated steel--very high - clay texture, moderately well drained

Corrosivity, concrete--moderate - pH 5.0 - 6.0
--high - pH less than 5.0

Dwellings--severe - high shrink-swell potential, drainage

Septic tank filter fields--severe - permeability

Sewage lagoons--slight - 0-2% slopes
--moderate - 2-5% slopes

Local roads and streets--severe - traffic-supporting capacity, shrink-swell potential

Light industries--severe - shrink-swell potential, drainage

Sanitary landfill (trench type)--severe - clay texture

Shallow excavations--severe - clay texture, drainage

The principal alternate conceptual land uses from best-suited to least-suited for the Wilson series are range, pasture, woodland (sweetgum, Liquidambar styraciflua), and recreation. Major soil features effecting other selected uses are:

Highway location--severe - shrink-swell potential, traffic-supporting capacity

Pond reservoir areas--none to slight

Pond embankments--moderate - stability and compressibility

Excavated ponds (aquifer fed)--severe - depth of permanent water table

Corrosivity, uncoated steel--very high - somewhat poorly drained clayey texture

Corrosivity, concrete--moderate - pH 5.6 - 6.0
--low - pH 6.0 - 7.8

Foundations for low buildings--severe - shrink-swell potential

Septic tank filter fields--severe - permeability

Sewage lagoons--slight - 0-2% slopes
--moderate - 2.5% slopes - slope

Streets and low cost raods--severe - shrink-swell potential, traffic-supporting capacity

Light industries--severe - shrink-swell potential, corrosivity uncoated steel

The principal alternate conceptual land uses from best suited for the Navasota series are woodlands (cottonwood-Populus deltoides, green ash-Fraxinus pennsylvanis, cherrybark oak-Quercus falcata var. pagodaefolia, sycamore-Platanus occidentalis, yellow poplar-Liriodendron tulipifera, sweetgum-Liquidambar styraciflua, and loblolly pine-Pinus tadea), pasture, range, and recreation. Major soil features effecting other selected uses are:

Pond reservoir areas--slight

Pond embankments--moderate - medium to high compressibility, resistance to piping and erosion

Excavated ponds (aquifer fed)--severe - depth to permanent dry season water table, permeability of ground water aquifer

Excavated ponds (runoff fed)--slight

Corrosivity, uncoated steel--very high - drainage class and texture

Corrosivity, concrete--high to moderate - texture and reaction

Dwellings--severe - flooding

Septic tank filter fields--severe - permeability class, flooding hazard

Sewage lagoons--slight

Local raods and streets--severe - flood hazard

Light industries--severe - flooding, corrosivity uncoated steel

SOIL CAPABILITY CLASS IV

The third category is comprised of Soil Capability Class IV, subclass "e". This class has severe limitations that reduce the choice of plants, require careful management, or both. The subclass "e" indicates erosion hazard.

The principal soil in this category is Cuthbert. The primary land use on this series should be wildlife comprised of open-land and woodland wildlife choices.

The principal alternate conceptual land uses from best-suited to least-suited for the Cuthbert series are woodland (slash pine-Pinus elliottii, shortleaf pine-P. echinata, and loblolly pine-P. taeda), recreation, pasture, and range. Major soil features effecting other selected uses are:

Highway location--severe - traffic-supporting capacity, slopes greater than 15%

Pond reservoir areas--moderate - permeability, depth to permeable material

Pond embankments--moderate - fair slope stability

Excavated ponds (runoff fed)--moderate - permeability

Excavated ponds (aquifer fed)--severe - depth to dry season water table

Corrosivity, uncoated steel--moderate - texture

Corrosivity, concrete--high - acidity

Foundations for low buildings--moderate - unified soil group, slopes 6-15% and severe - slopes greater than 15%

Septic tank filter fields--severe - permeability, slopes greater than 10%

Sewage lagoons--slight - 0-2% slopes
--moderate - slopes 2-7%
--severe - slopes greater than 7%

Streets and low-cost roads--severe - traffic-supporting capacity, slopes greater than 15%

Light industries--moderate - bearing strength on 1-8% slopes and severe - slopes greater than 8%

SOIL CAPABILITY CLASS IV, V, AND VI

The fourth category of soils in the region is comprised of Soil Capacity Classes IV, V, and VI with subclass "s". Class IV soils have severe limitations that reduce the choice of plants, require special management, or both. Class V soils are subject to little or no erosion but have other limitations, impractical to

remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. Class IV soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover. The principal soil series in this category is the Lakeland.

The principal land uses are range and woodland (slash pine, Pinus elliottii; loblolly, P. taeda; and shortleaf, P. echinata).

The principal alternate conceptual land uses from best-suited to least-suited are wildlife, recreation, and pasture. Major soil features effecting other selected uses are:

Highway location--slight - 0-6% slopes
--moderate - 6-15% slopes
--severe - 15%+ slopes

Pond reservoir areas--severe - rapid permeability

Pond embankments--severe - rapid permeability, needs binder; slope stability

Excavated ponds (runoff fed)--severe - rapid permeability

Excavated ponds (aquifer fed)--severe - depth to water table

Corrosivity, uncoated steel--low

Corrosivity, concrete--moderate to high - soil reaction, texture

Foundations for low buildings--moderate - bearing strength and severe - slopes of 15%+

Septic tank filter fields--slight - 0-5% slopes
possible contamination of water supplies

--moderate - 5-10% slopes - possible contamination of water supplies

--severe - 10%+slopes - possible contamination of water supplies

Sewage lagoons--severe - rapid permeability

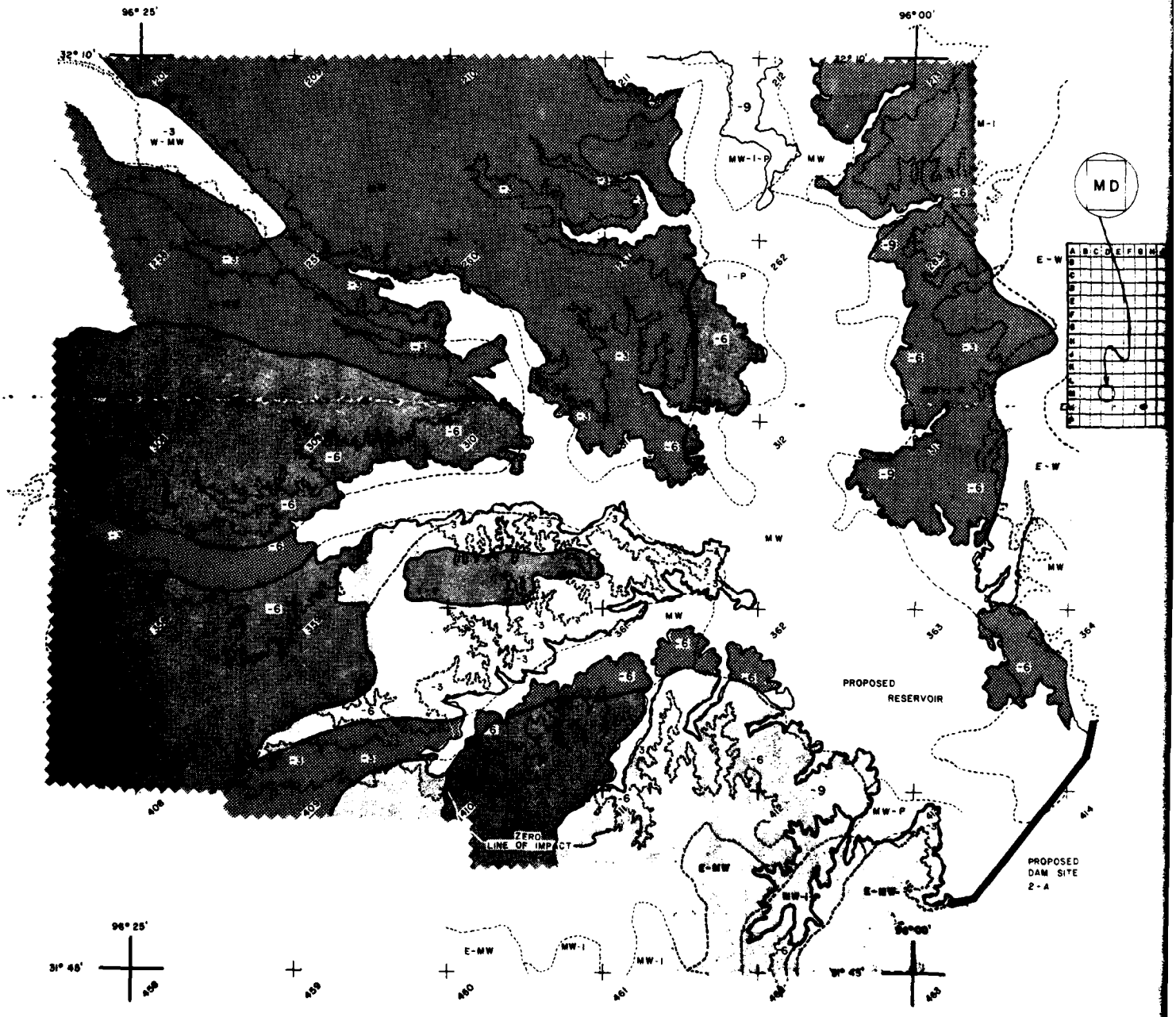
Streets and low-cost roads--slight - 0-6% slopes
--moderate 6-15% slopes
--severe 15%+ slopes

Light industries--moderate - 0-8% slopes - bearing strength

--severe - 8%+ slopes

PLATE

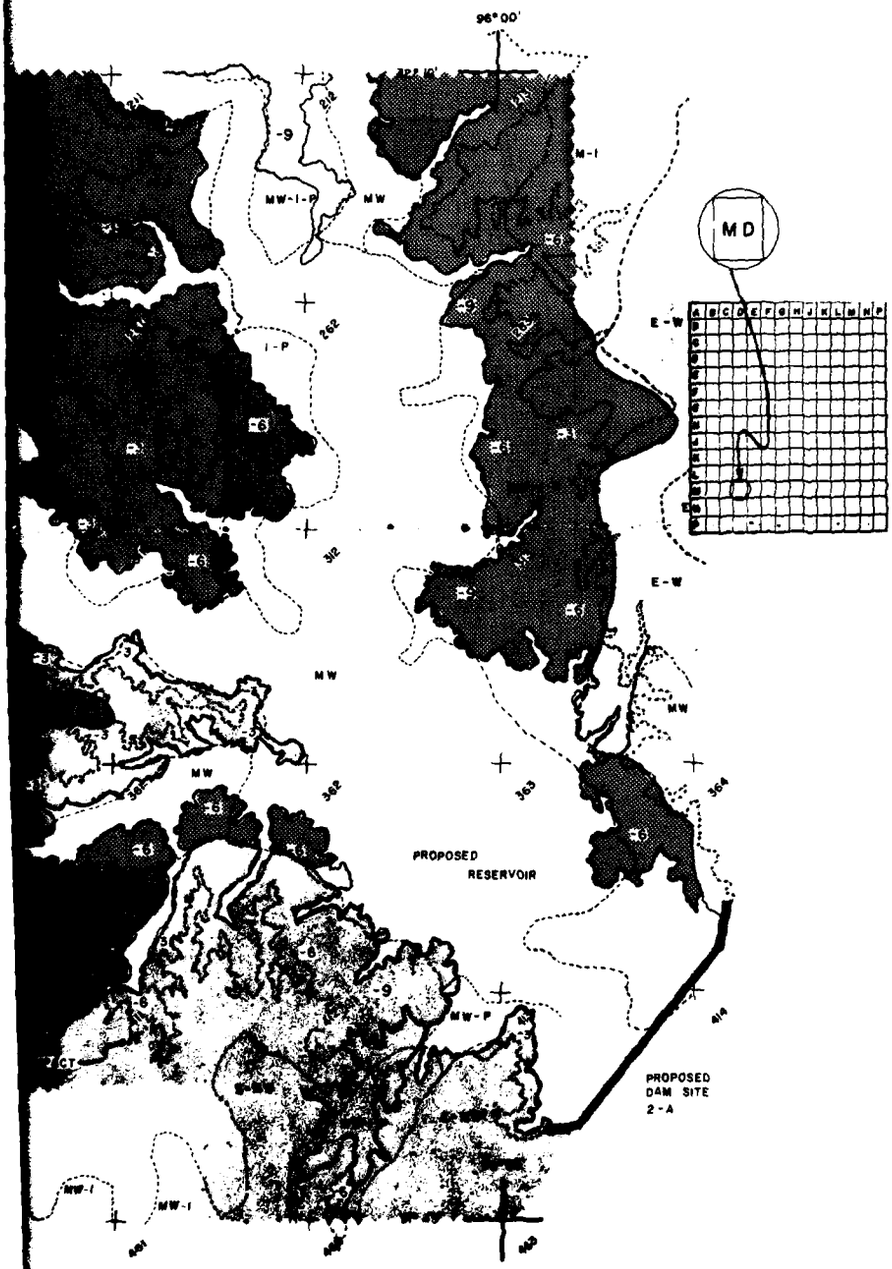
SOIL AREAS FOR
USE ADJUSTMENT
LOWER RESERVO

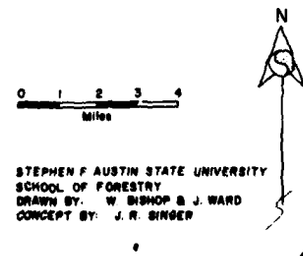


STEPHEN F AUSTIN STA
SCHOOL OF FORESTRY
DRAWN BY W BISHOP
CONCEPT BY J. R. [illegible]

PLATE G-14

SOIL AREAS FOR LAND USE ADJUSTMENT: LOWER RESERVOIR REGION

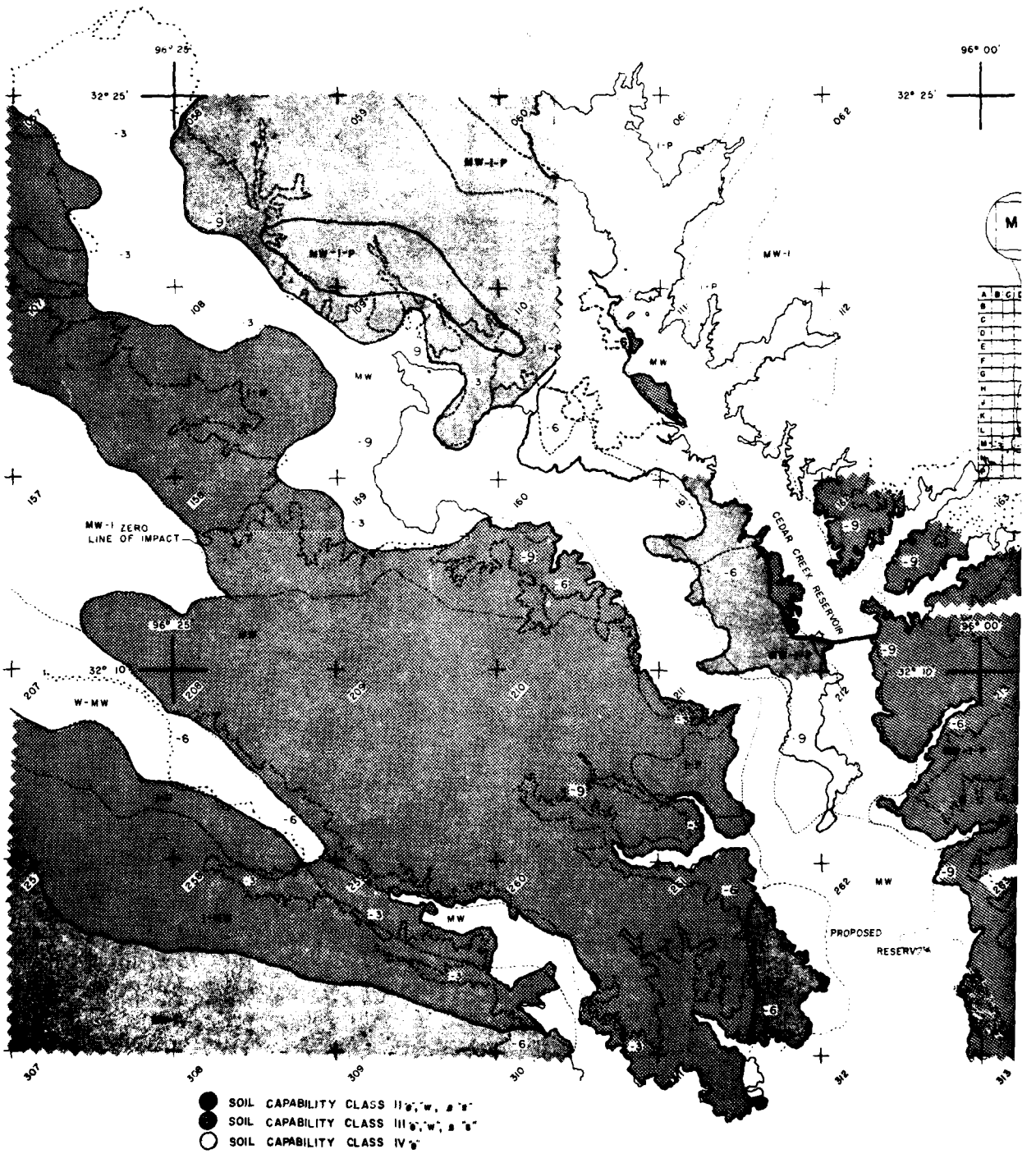




STEPHEN F AUSTIN STATE UNIVERSITY
SCHOOL OF FORESTRY
DRAWN BY: W. BISHOP & J. WARD
CONCEPT BY: J. R. SINGER

PLATE

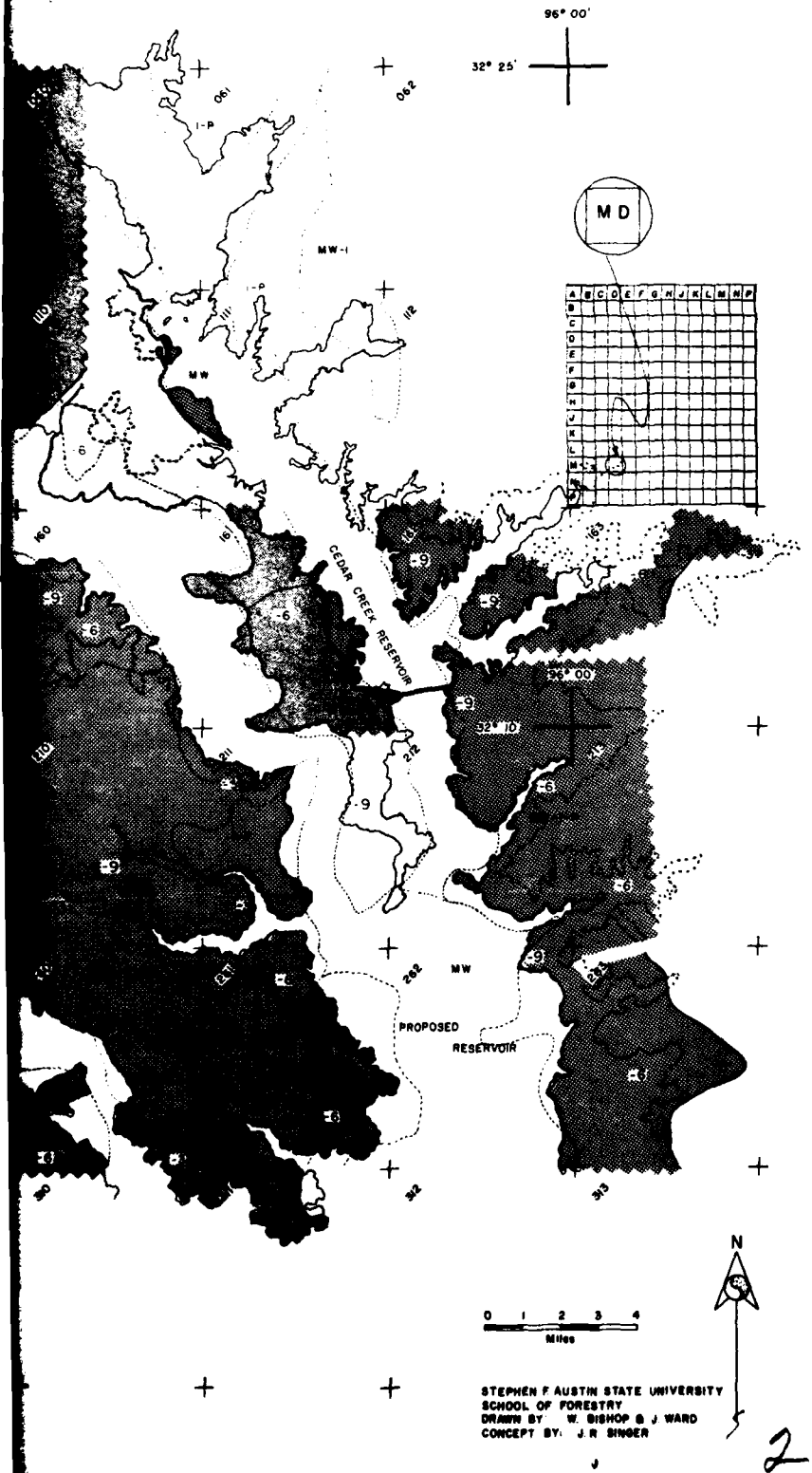
SOIL AREAS FOR
USE ADJUSTMEN
UPPER RESERVOI



STEPHEN F AUSTIN
SCHOOL OF FORESTR
DRAWN BY W BISH
CONCEPT BY J R

PLATE G-15

SOIL AREAS FOR LAND
USE ADJUSTMENT:
UPPER RESERVOIR REGION



2

TABLE G-4. Drainage Characteristics and Map Locations of Soil Associations

Map Location by Quadrangle No.	Drainage Symbol (Used on Map)	Drainage Description	Soil Association
264, 314	E	Excessive	LAKELAND
213, 214, 263, 264, 313, 314	E-W	Excessive to well	LAKELAND - BOWIE
410, 411, 412, 413	E-MW	Excessive to moderately well	LAKELAND - CUTHBERT
157, 207, 208	W-MW	Well to moderately well	TRINITY - CATALPA
358, 359, 360, 361	MW	Moderately well	KAUFMAN - TRINITY
059, 060, 061, 110, 111, 161, 162, 212	MW	Moderately well	KAUFMAN
057, 058, 107, 108, 109, 158, 159, 110, 160, 161, 210, 211, 259, 269, 308, 309, 310, 311, 312, 261, 262, 361, 362, 363, 413, 414	MW	Moderately well	TRINITY - CLAY
313, 363, 364	MW	Moderately well	CUTHBERT

TABLE G-4 (Con't). Drainage Characteristics and Map Locations of Soil Associations

Map Location by Quadrangle No.	Drainage Symbol (Used on Map	Drainage Description	Soil Association
157, 158, 159, 160, 207, 208, 209, 210, 211, 259, 260, 261 310, 311	MW	Moderately well	BELL - BURLESON
061, 062, 107, 111, 157, 158, 257, 258, 259, 260, 308, 309, 310, 358, 359, 410, 411	MW-I	Moderately well to imperfect	WILSON - CROCKETT
213, 263	M-I	Moderate to imperfect	SAWYER - SUSQUEHANNA
208, 258, 259, 260	I-MW	Imperfect to moderately well	HOUSTON BLACK - HOUSTON
057, 107, 108, 157, 158, 159, 160, 208, 258	I-M	Imperfect to moderate	HOUSTON - SUMTER
412, 413	MW-P	Moderately well to poor	KAUFMAN - NAVASOTA
411, 412	MW-I-P	Moderately well to imperfect to poor	EDGE - SAWYER

TABLE G-4 (Con't). Drainage Characteristics and Map Locations of Soil Associations

Map Location by Quadrangle No.	Drainage Symbol (Used on Map)	Drainage Description	Soil Associations
111, 112, 161, 162, 212, 213, 262, 263, 312, 313, 363, 364	MW-I-P	Moderately well to imperfect to poor	SAWYER - AXTELL
058, 059, 060, 109, 110, 161, 162, 211, 212	MW-I-P	Moderately well to imperfect to poor	WILSON - BURLESON
060, 061, 111, 210, 211, 261, 311, 359, 360, 361, 362, 409, 410, 411, 412	I-P	Imperfect to poor	EDGE - TABOR
058, 059, 108, 109 110, 111, 161,	I-P	Imperfect to poor	AXTELL - IRVING

ENVIRONMENTAL IMPACT ANALYSIS

This section discusses the individual field checked impact zones from greatest, through medium to minor impact. They are keyed to map quadrangle numbers.

The impact intensity--with in-group rankings of most critical, second and third--priority ranking for remedial action, total extent of zone and extent of field check are given. Each zone is discussed first by describing the land use then describing the primary impact on land use intensity--the impact that cannot be avoided. Land use productivity as well as the irreversible and irretrievable commitment of the land resource are presented.

Each discussion of an impact zone is concluded with a discussion of the environmental strata and an analysis of the secondary impacts on said strata caused by land use shifts. The environmental strata discussed are the lithosphere, biosphere, and hydrosphere.

ZONE NINE: 211

Quadrangle #211 has an overall rating of minus nine. Within the nine category it is ranked most critical. The total extent of this impact area within the 211 quadrangle is 1,668.96 acres. The area covered by actual

field checking on this quadrangle is 556.32 acres composed of plots AN, BN, CN, DN, EN, and FN.

Description of Land Use

Man's intensive land use activities in this area are farming for feed crops, grazing of cattle, and industrial activity from the Texas Power and Light Plant and the NIPAK Fertilizer Plant. The community of Trinidad is in the center of the minus nine impact zone and is economically dependent upon T.P.L. and NIPAK.

Impact Analysis of the Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...reduction in farming to only the dryest seasons as the moisture content of the soil will be too high during the wet seasons for planting, cultivation or harvest.

...grazing will have to be adjusted in intensity and to a seasonal basis.

...halting and shifting of residential development as much of the area will be too moist for residential land use.

...movement of cemeteries and sewage disposal areas out and away from reservoir.

...a direct loss of habitable home sites, businesses, and residential land base due to flooding by reservoir.

...a location shifting of economic base industries (Texas Power & Light and NIPAK Fertilizer Plant).

The long range (after ten years) primary impact and effects on the intensity of land use in this area will be:

...indirect loss of habitable home sites, businesses, and intensive use of the land base due to increased moisture in soil.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Farming, residential and industrial development will be greatly reduced, perhaps terminated. Recreational potential may develop to some extent in the form of Green Tree Reservoirs; grazing increases will be on a seasonal basis.

Land Use Commitment

The irreversible or irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture. This will necessitate a permanent reduction in land use intensity.

Description of Lithosphere

The lithosphere condition of encompassing environment is defined as soil and geological characteristics.

Soils in this area are the WILSON-BURLESON (map location AN, BN, CN, DN, EN and FN) associations. The WILSON-BURLESON soils are moderately to imperfectly drained and are extremely susceptable to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent; the potential exists to recharge these aquifers.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of project caused land use shifts on the lithosphere will be:

...water in or on the soil will interfere with plant growth or cultivation reducing access of heavy equipment to fields.

...a high risk of erosion on slopes unless close growing plant cover is maintained.

...row crop farming will change to pasture.

The secondary long range (after ten years) effects on the lithosphere will be:

...a change in drainage pattern of the soils due to a constant and increased wetness caused by the reservoir, soils and recharge area.

...increased slump erosion may occur on slopes as wetness increases.

Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment) and agriculture. The forest occurs sparsely and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of coastal bermuda grass on most of the cleared areas with some underbrush and browse species found in the wooded areas.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects of the biosphere in this area will be:

...transition from upland hardwoods to those tree species common to the river bottoms.

...killing of some tree species due to increased wetness.

...omission of farm row cropping due to increased wetness.

...natural reproduction of trees will be hampered.

The long term (after ten years) secondary impact and effects of the biosphere in this area will be:

...conversion of forests to bottomland hardwoods.

...invasion of swamp plants.

...establishment of understory vegetation that may enhance quality of wildlife habitat.

Description of Hydrosphere

The hydrosphere of the encompassing environment is composed of approximately 2,000 acre-feet per square mile of precipitation, and about 350 acre-feet per square mile of runoff.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

...inundation of part of Trinidad by the rising water of the reservoir.

The long range (after ten years) secondary impact of the land use shifts on the hydrosphere in this area will be:

...soil will become more moist and soggy after rains and will remain for longer periods of time, resulting in severe swampy conditions, this condition will become permanent and land use should be adjusted to capitalize on low intensity use.

...an increase in the level of the watertable.

...the short run effects will become permanent.

ZONE NINE: 212

Quadrangle 212 has an overall rating of minus nine. Within this category it is ranked most critical. The total extent of this impact area within the 212 quadrangle is 1,205.36 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots GA, GB, HB, JB, KA, and LA.

Description of Land Use

Man's intensive land use activities in this area are farming for feed crops, grazing of cattle, and industrial activity from the Texas Power and Light Plant and the NIPAK Fertilizer Plant. The community of Trinidad is in the center of the minus nine impact zone and is economically dependent upon Texas Power and Light and NIPAK.

Impact Analysis on the Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...reduction in farming to only the driest seasons as the moisture content of the soil will be too high during wet seasons for planting, cultivation or harvest.

...reduction in grazing intensity to prevent erosion caused by overgrazing.

...haulting and shifting of residential development as much of the community will become flooded.

...movement of cemeteries and sewage disposal areas out and away from the reservoir.

...direct loss of habitable home sites, businesses, and land base due to flooding by the reservoir.

...a location shifting of economic base industries (Texas Power and Light and NIPAK Fertilizer Plant).

The long range (after ten years) primary impact and effects on the intensity of land use in this area will be:

...indirect loss of habitable home sites, businesses, and intensive use land base due to increased moisture in the soil.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Farming, residential and industrial development will be greatly reduced, perhaps terminated. Recreational potential may develop to some extent in the form of Green Tree Reservoirs; grazing increases will be on a seasonal basis.

Land Use Commitment

The irreversible or irretrievable commitment of the present land resource will be the establishment of a

permanent condition of increased moisture. This will necessitate a permanent reduction in land use intensity.

Description of Lithosphere

The lithospheric conditions of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the TRINITY CLAYS. The TRINITY CLAYS are moderately to imperfectly drained, and are extremely susceptable to erosion. The underlying geology is composed of alluvium deposits and does not influence the hydrology of the impact area.

Impact Analysis of the Listhosphere

The secondary short range (within five years) effects of project caused land use shifts on the lithosphere will be:

...water in or on the soil will interfere with plant growth or cultivation reducing access of heavy equipment to fields.

...a high rish of erosion on slopes unless close growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...a change in drainage pattern of the soils due to a constant and increased wetness caused by the reservoir and soils.

...increased slump erosion may occur on slopes as wetness increases.

Description of the Biosphere

The biosphere description of the encompassing environment is forest (see section on soil areas for land use adjustment for names of tree species) and agriculture. The forest occurs sparsely and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of coastal bermuda grass on most of the cleared areas with some underbrush and browse species found in the wooded areas.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...transition from upland hardwoods to those tree species common to the river bottoms.

...killing of some tree species due to increased wetness.

...omission of farm row cropping due to increased wetness.

...natural reproduction of trees will be hampered.

The long term (after ten years) secondary impact and effects on the biosphere in this area will be:

...conversion of forests to bottomland hardwoods.

...invasion of swamp plants.

...establishment of understory vegetation that may enhance quality of wildlife habitat.

Description of Hydrosphere

The hydrosphere of the encompassing environment is composed of approximately 2,000 acre feet per square mile of precipitation, and about 350 acre feet per square mile of runoff.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

...inundation of part of Trinidad by the rising water of the reservoir.

The long range (after ten years) impact of the land use shifts on the hydrosphere in this area will be:

...soil will become more moist and soggy, after rains and will remain for longer periods of time, resulting in severe swampy conditions, this condition will become permanent and land use should be adjusted to capitalize on low intensity use.

...an increase in the level of the water table.

...the short run effects will become permanent.

ZONE NINE: 162

Quadrangle #162 has an overall rating of minus nine. Within the nine category it is ranked second. The total extent of this impact area within the 162 quadrangle is 2,410.72 acres. The area covered by actual field checking on this quadrangle is 463.60 acres composed of plots NE, NF, NG, NH, and NJ.

Description of Land Use

Man's intensive land use activities in this area are presently farming for feed crops, with much grazing. Some recreation occurs near Cedar Creek Reservoir with some small residences being scattered throughout the area toward Malakoff.

Impact Analysis on the Land Use

The short range (within five years) primary impact and effects on the cultural sphere in this area will be:

...reduction in farming to only the dryest seasons as the moisture content of the soil will be too high during wet seasons for planting cultivation and harvest with heavy equipment.

...adjustment of grazing to prevent erosion caused by overgrazing.

...continuing residential development in a direction out and away from the impact zone.

The long range (after ten years) primary impact and effects on the intensity of land use in this area will be:

> ...restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir and to create a higher scenic value by restriction of reservoir boundary area to a tree conservation zone.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Farming and residential development in the area will be greatly reduced, while recreational development will be increased. Improved pastures should be developed for increased grazing intensity.

Land Use Commitment

The irreversible or irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture. Land use commitment will be primarily to grazing and recreation.

Description of Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the KAUFMAN (NE, NF, NG)

AND SAWYER-AXTELL (NH, NJ) associations. The KAUFMAN soils are moderately well drained while the SAWYER-AXTELL soils are imperfectly to poorly drained. They are both extremely susceptable to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The inter-relationship of land use and major aquifers are not known at this time. However, any land use that will exert positive influences on maintaining the water table and base flow of springs and streams should be encouraged.

Impact Analysis of Lithosphere

The secondary short range (within five years) effects of project caused land use shifts on the lithosphere will be:

...water in or on the soil will interfere with plant growth or cultivation.

...a high risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...a change in drainage pattern of the soils due to a constant and increased wetness caused by the reservoir.

...increased slump erosion will occur on slopes as wetness increases under high intensity use.

Description of Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment) and agriculture. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of heavy underbrush within the borders of the wooded areas, browse plants for wildlife were in abundance. Beaver and quail signs were seen.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing some of the understory vegetation now present.

...trees within three feet elevation of the reservoir pool level will be killed.

...natural reproduction of trees will be hampered.

The long term (after ten years) secondary impact and effects on the biosphere in this area will be:

...an establishment of understory vegetation that may enhance quality of wildlife habitat.

...depending on micro-topography, some areas will convert to swamp plants with trees being killed due to increased wetness.

Description of Hydrosphere

The hydrosphere of the encompassing area is composed of approximately 2000 acre feet per square mile of precipitation and about 350 acre feet per square mile of runoff.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) impact of the shifts in land use on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will become swampy due to a low infiltration and percolation rate.

...prevailing wet conditions after rains due to the high moisture content.

ZONE NINE: 412

Zone Identification

Quadrangle #412 has an overall rating of minus nine. Within the nine category it is ranked second. The total extent of this impact area within the 412 quadrangle is 2,039.84 acres. The area covered by actual field checking on this quadrangle is 370.88 acres composed of plots AH, AJ, AK, and BF.

Description of the Land Use

Man's intensive land use activities in this area consist of scattered residences throughout the area and limited cattle grazing on unimproved pasture. Some land in the area has presently been purchased for strip-mining purposes by Texas Power and Light.

Impact Analysis on the Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

> ...reduction of farming to only the driest seasons as the moisture content of the soil will be too high during wet seasons for cultivation or harvest.

...grazing will have to be greatly reduced to prevent erosion caused by overgrazing, intensity may be varied on a seasonal basis.

...restricting residential development away from the impact zones.

...to move grazing and farming away from the reservoir above topography break if possible to prevent erosion into and pollution of reservoir.

...to flood areas of lignite beds worked by the Texas Power and Light plant. The lignite beds will have to be immediately excavated and land restored to conditions for future use.

The long range (after ten years) primary impact and effects on the intensity of land use in this area will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferably above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...a development of a hierarchy of land use intensity with timing alternatives of use to maximize returns.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be greatly reduced whil recreational use may be increased. Again, the Green Tree Reservoir concept may be applied here.

The strip-mined areas will be refilled--creating good pasture lands which will be raised in elevation and will be less effected by the moisture. This will improve the land use potential for grazing.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture on some sites. The entire area may see a mix of land use for seasonal grazing, recreation, hunting and some cluster development for recreational homes.

Description of Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the EDGE - TABOR association which are imperfectly to poorly drained and are extremely susceptable to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of project caused land use shifts on the lithosphere will be:

...water in or on the soil interferes with plant growth or cultivation.

...a high risk of erosion on slopes unless close growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...soil is limited mainly because it is shallow, wet, or stony.

...increased erosion if land use intensity exceeds carrying capacity.

...a change in drainage pattern of the soils due to a constant and increased wetness.

Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment) and agriculture. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of low quality hardwoods with dense underbrush, a potential wildlife habitat. There was no improved pasture with some unimproved pasture presently in use.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...trees within three feet elevation of the reservoir pool level will be killed.

...killing some of the present understory vegetation types.

...natural reproduction of trees will be hampered.

The long (after ten years) term secondary impact and effect on the biosphere in this area will be:

...a tendency to convert to a swampy environment.

...trees being killed due to swampy conditions.

...establishment of lower quality understory vegetation.

Description of Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,050 acre-feet per square mile. Runoff is approximately 365 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) impact of the land use shifts on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...areas will become swampy due to low infiltration and percolation rate.

...prevailing wet conditions after rains due to the high soil moisture content.

ZONE NINE: 262

Quadrangle #262 has an overall rating of minus nine. Within the nine category it is ranked third. The total extent of this impact area within the 262 quadrangle is 741.76 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots JP, KP, LP, MP, NP, and PP.

Description of Land Use

Man's land use activities in this area are almost entirely composed of highly improved pasture land for grazing cattle. Members of the Southwestern Cattle Association own most of the prime bottomland pasture in the area and has much improved coastal bermuda grass on it.

Impact Analysis on the Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...much of the improved pasture land will become flooded--a loss of agriculture land base.

...must move grazing away from reservoir edge--above topography break if possible to prevent erosion into and pollution of the reservoir.

...present levee will be covered by pool level water of the reservoir.

...grazing in the area may have to be limited due to increased soil moisture.

...members of the Southwestern Cattle Association will have to relocate pasture land possible in surrounding areas.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...to provide alternative land base for pasture due to increased pressure on uplands from loss of bottomland pastures.

...a restriction of the reservoir boundary area to a tree conservation zone.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Farming and residential development in the area will be greatly

reduced while recreational use may be increased. Grazing will be moved to upland areas requiring establishment of improved pastures.

Land Use Commitment

The irreversible or irretrievable commitment of the present land resource will be establishment of a permanent condition of flooding on prime bottomland pasture.

Description of Lithosphere

The lithosphere condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL associations which are imperfectly to drained and are extremely susceptable to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of the project caused land use shifts on the lithosphere will be:

...water in or on the soil interferes with plant growth or cultivation reducing access of heavy equipment to fields.

...a high rise of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...increased erosion if high intensity grazing is practiced without appropriate conservation measures.

...a change in drainage pattern of the soils due to a constant and increased wetness ~~caused~~.

...increase in limiting effects of soil shallowness.

Description of the Biosphere

The biosphere description of the encompassing environment is forest (for names of tree species see section on soil areas for land use adjustment) and agriculture. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Observations also showed the presence of high quality coastal bermuda grass on most of the cleared areas with some browse species for wildlife within the wooded areas.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...much of this highly improved pasture will be flooded by the reservoir.

...increased moisture will necessitate some change in pasture grasses.

...killing of trees within three feet elevation of the reservoir pool level.

The long term (after ten years) secondary impact and effects of land use shifts on the biosphere in this area will be:

...conversion of understory vegetation to bottomland species from upland species

...improved coastal bermuda pasture will become of less value if overgrazing is practiced.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of approximately 2,000 acre feet per square miles of precipitation and about 350 acre feet square miles of runoff.

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere on this area will be:

...an increase in the moisture content of the soils of the area and a continued rising water table.

The long range (after ten years) secondary impact of the land use shifts on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...areas will become swampy due to a low infiltration and percolation rate.

...prevailing wet conditions after rains due to the high moisture content.

ZONE SIX: 161

Quadrangle "161 has an overall rating of minus six. Within this category it is ranked most critical. The total extent of this impact area within the 161 quadrangle is 8,252.08 acres. The area covered by actual field checking on this quadrangle is 463.60 acres composed of plots BD, BE, CE, DE, and DF.

Description of Land Use

Man's intensive land use activities in this area are related to the Cedar Creek Reservoir. Farming and grazing activities are presently within the area to be inundated but not on the steeper slopes outside of the reservoir pool.

Impact Analysis on the Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area,

the impact that cannot be avoided, will be:

...retain use of land mainly in reservoir service use

...some limited grazing to prevent erosion and pollution into reservoir.

...restriction of residential development away from this impact zone.

...restriction of farming from this area.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational and reservoir use only with some aesthetic uses permitted such as grazing.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be a restriction of recreational use. However, low intensity recreational use may be increased.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table with the above mentioned low intensity land uses.

Description of Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geologic characteristics. Soils in this area are the AXTELL - WILSON association which is imperfectly to poorly drained and is susceptable to erosion.

The underlying geology is alluvium and strengthens the existing drainage characteristics of this soil.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere will be:

...water in or on the soil interfering with plant growth or cultivation.

...a medium risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...soil limitations of shallowness, wetness or stoneness will be more influential.

...increased erosion unless erosion prevention programs are maintained.

...a permanent change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is

very slightly forested. The vegetation of the area is composed of deep grasses such as Coastal Bermuda.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing of trees within three feet elevation of the reservoir pool level.

...nutrient deficiency will occur in some of the present vegetation.

...natural reproduction of scattered trees will be greatly hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...establishment of shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,090 acre-feet per square mile. Runoff is approximately 385 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact

of the shifts in land use on the hydrosphere of this area will be:

> ...the pool level of the Tennessee Colony Reservoir will reach the bottom of the Cedar Creek Reservoir spillway.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area will be:

> ...the establishment of low intensity land uses due to prevailing wet conditions after rains.

ZONE SIX: 212

Quadrangle #212 has an overall rating of minus six. Within this category it is ranked most critical. The total extent of this impact area within the 212 quadrangle is 2,318.00 acres. The area covered by actual field checking on this quadrangle is 576.32 acres composed of plots HM, JL, JK, KJ, LH, and LG.

Description of the Land Use

Man's intensive land use activities in this area are related to producing oil fields, cattle grazing on improved and non-improved pasture, and farming of row crops.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...restriction of farming during periods of prolonged percipitation while being only hampered during the normal wet-dry seasons.

...reduction of grazing to prvent erosion caused by overgrazing.

...restriction of residential development away from the impact zones.

...oil production activity will have to be adjusted to maintain water quality.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferably above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...oil production activity will have to be encouraged to maintain water quality.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be

somewhat reduced while recreational use may be increased. The oil production activity must be encouraged to maintain water quality.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table. This will require some low intensity land uses on reservoir boundary.

Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL (HM, JL, JK, and KJ) and TRINITY (LH and LG) associations which are imperfectly to poorly drained and are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The exact effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere will be:

...soil limitations of shallowness, wetness, or stoneness will be more influential.

...increased erosion unless erosion prevention programs are maintained.

...a permanent change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing of trees within three feet elevation of the reservoir pool level.

...nutrient deficiency will occur in some of the present understory vegetation types.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...trees being killed and susceptible to disease and insect attack due to nutrient deficiency.

...establishment of understory shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,090 acre-feet per square mile. Runoff is approximately 385 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a rising water table.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...an approach to swampy conditions in some areas due to a low infiltration and percolation rate.

...a prevailing wet condition after rains due to the high soil moisture content.

ZONE SIX: 311

Quadrangle #311 has an overall rating of minus six. Within this category it is ranked most critical. The total extent of this impact area within the 311 quadrangle is 2,318.00 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots AD, AF, BE, BF, BG and CG.

Description of the Land Use

Man's intensive land use activity in this area are related to grazing with some scattered residences throughout this area, the impact that cannot be avoided, will be:

...restriction of farming during periods of prolonged percipitation while being only hampered during the normal wet-dry seasons.

...reduction of grazing to prevent erosion caused by overgrazing.

...restriction of residential development away from the impact zones.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferable above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...the permanent establishment of low intensity mixed land uses.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table. This will require some low intensity land uses on the reservoir boundary.

Description of the Lithosphere

The lithosphere condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the BELL - BURLESON association which is moderately well drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The exact effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere will be:

...water in or on the soil interfering with plant growth or cultivation.

...a medium risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...soil limitations of shallowness, wetness, or stoneness will be more influential.

...increased erosion unless erosion prevention programs are maintained.

...a permanent change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is

composed of bottomland hardwoods. These species are shallow rooted. The area has some abandoned pasture land.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing of trees within three feet elevation of the reservoir pool level.

...nutrient deficiency will occur in some of the present understory vegetation types.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...trees being killed and susceptible to disease and insect attack due to nutrient deficiency.

...establishment of understory shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,070 acre-feet per square mile. Runoff is approximately 360 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a rising water table.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area will be:

...areas will approach swampy conditions due to a low infiltration and percolation rate.

...an increase in the level of the water table.

...the prevailing of wet conditions after rains due to the high soil moisture content.

ZONE SIX: 361

Quadrangle #361 has an overall rating of minus six. Within this category it is ranked most critical. The total extent of this impact area within the 361 quadrangle is 7,973.92 acres. The area covered by actual field checking on this quadrangle is 463.60 acres composed of plots GH, HK, JK, KK, and LK.

Description of the Land Use

Man's land use activities in this area are related to livestock grazing on improved and unimproved pastures,

producing oil fields, and scattered home sites throughout the area.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...restriction of farming during periods of prolonged percipitation while being only hampered during the normal wet-dry seasons.

...reduction of grazing to prevent erosion caused by overgrazing.

...restriction of residential development away from the impact zones.

...restriction of grazing and row crop farming to areas above the primeary terrace above the reservoir.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferable above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...the permanent establishment of low intensity mixed land uses.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table. This will require lower intensity land uses.

Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the EDGE - TABOR association which is imperfectly to poorly drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The exact effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere will be:

...water in or on the soil intefering with plant growth or cultivation.

...a medium risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...soil limitations of shallowness, wetness, or stoneness will be more influential.

...increased erosion unless erosion prevention programs are maintained.

...a permanent change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations showed the presence of much coastal bermuda. Other natural grasses exist where forests were lacking.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact

and effects on the biosphere in this area will be:

...killing of trees within three feet elevation of the reservoir pool level.

...nutrient deficiency will occur in some of the present understory vegetation types.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...trees being killed and susceptible to disease and insect attack due to nutrient deficiency.

...establishment of understory shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,075 acre-feet per square mile. Runoff is approximately 365 acre-feet per square mile.

Impact Anaylsis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a rising water table.

...to regulate oil production activities in the watersheds draining into the reservoir in order to maintain water quality.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...areas will approach swampy conditions due to a low infiltration and percolation rate.

...the prevailing of wet conditions after rains due to the high soil moisture content.

...regulation of the oil production activity to maintain water quality.

ZONE SIX: 208

Quadrangle #208 has an overall rating of minus six. Within this category it is ranked second. The total extent of this impact area within the 208 quadrangle is 5,747.64 acres. The area covered by actual field checking on the quadrangle is 556.32 acres composed of plots KH, KJ, KK, KL, JM, and JN.

Description of the Land Use

Man's intensive land use activities in this area are related to row crop farming, sizable areas of improved and unimproved pasture land and producing oil wells. Also located in the area was a sanitary land fill adjacent to a creek.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...restriction of farming during periods of prolonged precipitation while being only hampered during the normal wet-dry seasons.

...reduction of grazing to prevent erosion caused by overgrazing.

...restriction of residential development away from the impact zones.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferable above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...the permanent establishment of low intensity mixed land uses.

Land Use Productivity

The long term (after ten years) land use activity and producitity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table. This will require low intensity land uses.

Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soil in this area are in the TRINITY - CATALPA (KH and KJ) and BELL - BURLESON (KK, KL, JM, and JN) associations. They are moderately well to well drained and moderately well drained respectively. They are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area.

The influence will be permanent as the potential is there to recharge these aquifers. The exact effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere will be:

...water in or on the soil interfering with plant growth or cultivation.

...a medium risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...increased evidence of shallow, wet, or stony soil limitations.

...increased erosion unless erosion prevention programs are maintained.

...a permanent change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Row crop agriculture and coastal bermuda are present in this area.

Impact Analysis of the Biosphere

The short term (with five years) secondary impact and effects of land use shifts on the biosphere in this area will be:

...trees will be under stress due to fluctuating soil moisture content and changing land use.

...nutrient deficiency will occur in some present understory vegetation types.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...trees being killed and susceptible to disease and insect attack due to nutrient deficiency.

...establishment of understory shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipation is approximately 1,925 acre-feet per square mile. Runoff is approximately 325 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a rising water table.

...sanditary land fill type solid waste disposal should be relocated to maintain water quality in watershed streams and reservoir.

...restriction of row crop farming and grazing to areas above the primary terrace of the reservoir.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this

area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will approach swampy conditions due to a low infiltration and precolation rate.

...the prevailing of wet conditions after rains due to high soil moisture content.

ZONE SIX: 313

Quadrangle #313 has an overall rating of minus six. Within this category it is ranked second. The total extent of this impact area within the 313 quadrange is 6,954.00 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots GC, HD, HE, JG, KH, and KJ.

Description of the Land Use

Man's intensive land use activities in this area are related to producing oil fields (with some oil spill associated with the wells), some improved pasture and prime bottomland grazing areas, scattered individual home sites, and limited recreation in the form of hunting or fishing.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on intensity of land use in this area, the impact that cannot be avoided, will be:

...restriction of farming during periods of prolonged precipitation while being only hampered during the normal wet-dry seasons.

...reduction of grazing to prevent erosion caused by overgrazing.

...restriction of residential development away from the impact zones.

...inundation of much prime bottomland grazing, forcing livestock upslope.

...an increase in potential pollution from the scattered oil fields due to increased moisture conditions.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferable above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...a reduction of hunting and associated recreational potential due to increased prolonged wet condtions.

...the permanent establishment of low and medium intensity mixed land uses.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table. This will require lower intensity land uses.

Description of the Lithosphere

The lithosphere condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL (GC, HD, HE, and JG) and LAKELAND - BOWIE (KH and KJ) associations which are imperfectly to poorly and excessively to well drained respectively. They are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the

impact area. The influence will be permanent as the potential is there to recharge these aquifers. The exact effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere will be:

...water in or on the soil interfering with plant growth or cultivation

...a medium risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...increased evidence of shallow, wet or stony, soil limitations.

...increased erosion unless erosion prevention programs are maintained.

...a permanent change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Prime bottomland grazing will be inundated forcing livestock upslope. This will also

influence wildlife and hunting in the area.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing of trees within three feet elevation of the reservoir pool level.

...nutrient deficiency will occur in some of the present understory vegetation types.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...trees being killed and susceptible to disease and insect attack due to nutrient deficiency.

...establishment of understory shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,075 acre-feet per square mile. Runoff is approximately 365 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of

this area will be:

...an increase in the moisture content of the soils of the area and a rising water table.

...rising water table will create permanent swampy contions in some warea.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will approach swampy conditions due to a low infiltration and percolation rate.

...the prevailing of wet conditions after rains due to the high soil moisture content.

ZONE SIX: 261

Quadrangle #261 has an overall rating of minus six. Within this category it is ranked third. The total extent of this impact area within the 261 quadrangle is 4,636.00 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots HL, JM, KM, LL, MK, AND MJ.

Description of the Land Use

Man's intensive land use activities in this area are related to grazing on improved and unimproved pasture

and row-crop farming. Wildlife habitat provides hunting potential.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...restriction of farming during periods of prolonged precipitation while being only hampered during the normal wet-dry seasons.

...reduction of grazing to prevent erosion caused by overgrazing.

...restriction of residential development away from the impact zones.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferable above the topography break.

...a restriction of reservoir boundary are to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...the permanent establishment of low and medium intensity mixed land use.

Land Use Productivity

The long term (after ten years) land use activity

and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be increased.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table. This will require some lower intensity land uses.

Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the EDGE - TABOR association which is imperfectly to poorly drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The exact effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on the lithosphere will be:

...water in or on the soil interfering with plant growth or cultivation

...a medium risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on the lithosphere will be:

...increased evidence of shallow, wet, or stony soil limitations.

...increased erosion unless erosion prevention programs are maintained.

...a fluctuating change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations showed areas of coastal bermuda and some row crops in the area.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing of trees within three feet elevation of the reservoir pool level.

...nutrient deficiency will occur in some of the present understory vegetation types.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...trees being killed and susceptible to disease and insect attack due to nutrient deficiency.

...establishment of understory shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,075 acre-feet per square mile. Runoff is approximately 390 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a rising water table.

...increased soil moisture will reduce intensity of farming and grazing.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will approach swampy conditions due to a low infiltration and percolation rate.

...the prevailing of wet condtions after rains due to the high soil moisture content.

ZONE SIX: 363

Quadrangle #363 has an overall rating of minus six. Within this category it is ranked third. The total extent of this impact area within the 363 quadrangle is 4,172.40 acres. The area covered by actual field checking on this quadrangle is 649.04 acres composed of plots AG, AH, AJ, AK, DP, EP, and FP.

Description of the Land Use

Man's intensive land use activities in this area are related to farming, grazing, and some scattered residences throughout the area. Much of the prime grazing pastures will become unindated by the rising water of the reservoir.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...restriction of farming during periods of prolonged precipitation while being only hampered during the normal wet-dry seasons.

...reduction of grazing to prevent erosion caused by overgrazing.

...restriction of residential development away from the impact zones.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferable above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and run-off into the reservoir and to create higher scenic value.

...the permanent establishment of low and medium intensity mixed land use.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Grazing, farming, and residential development in the area will be somewhat reduced while recreational use may be

increased.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a permanent condition of increased moisture, with some fluctuation of water table. This will require some lower intensity land uses.

Description of the Lithosphere

The lithospheric condition of the encompasing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL association which is imperfectly to poorly drained and is susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The exact effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on land use shifts on the lithosphere will be:

...water in or on the soil intefering with plant growth or cul tivation.

...a medium risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects on land use shifts on the lithosphere will be:

...increased evidence of shallow, wet, or stony soil limitations.

...increased erosion unless erosion prevention programs are maintained.

...a fluctuating change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations also showed the existence of heavy underbrush in the wooded areas--potential wildlife habitat.

Impact Analysis of the Biosphere

The shoft term (within five years) secondary impact and effects on the biosphere in this area will be:

...killing of trees within three feet elevation of the reservoir pool level.

...nutrient deficiency will occur in some of the present understory vegetation types.

...natural reproduction will be hampered.

The long range (after ten years) secondary impact and effects on the biosphere in this area will be:

...a tendency to approach a swampy condition.

...trees being killed and susceptible to disease and insect attack due to nutrient deficiency.

...establishment of understory shrub vegetation.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,080 acre-feet per square mile. Runoff is approximately 370 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area will be:

...an increase in the moisture content of the soils of the area and a rising water table.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area will be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table.

...some areas will approach swampy conditions due to a low infiltration and percolation rate.

...the prevailing of wet conditions after rains due to the high soil moisture content.

ZONE THREE: 263

Quadrangle #263 has an overall rating of minus three. Within this category it is ranked most critical. The total extent of this impact area within the 263 quadrangle is 5,934.08 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots CF, DF, GB, GA, HD, and JD.

Description of the Land Use

Man's land use activities in this area are land leasing for hunting purposes, grazing on improved and unimproved pasture, and scatter homes along a major highway.

Impact Analysis on the Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area will be:

...reduction of farming during periods of prolonged precipitation.

...care exercised in grazing to prevent erosion caused by overgrazing.

...gruiding of residential development away from the impact zones.

The long range (after ten years) primary impact and effects on intensity of land use in this area, the impact that cannot be avoided, will be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferable above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...the permanent establishment of low and medium intensity mixed land use.

Land Use Productivity

The long term (after ten years) land use activity and producitivity of this area will be changed. Farming, and residential development in the area will be slightly reduced while recreational use may be greatly increased and grazing may become seasonal.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a fluctuating condition of increased moisture with limited fluctuation of the water table resulting in the

permanent establishment of low and medium intensity mixed land uses perhaps of a seasonal nature.

Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the SAWYER - AXTELL association which are imperfectly to poorly drained and are susceptible to erosion.

The underlying geology is an outcropping of a major and minor aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of land use shifts on the lithosphere will be:

...water in or on the soil interfers with plant growth or cultivation after prolonged rains.

...a somewhat higher risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects of land use shifts on the lithosphere will be:

...increased evidence of shallow, moist, or stony soil limitations.

...increased erosion unless erosion prevention programs are maintained.

...a fluctuating change in drainage pattern of the soils.

...a lowering of local well water quality and quantity in minor aquifers if high intensity land use is practiced.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations showed the presence of beaver on Wildcat Creek at S. H. 59.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects of land use shifts on the biosphere in this area will be:

...a deficiency of nutrients in some of the present understory vegetation types.

The long range (after ten years) secondary impact and effects of land use shifts on the biosphere in this area will be:

...killing of some trees due to nutrient deficiency.

...the establishment of understory shrub vegetation due to increased soil moisture.

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table, but fluctuations with seasonal precipitation.

...areas will approach wetter conditions due to a lower infiltration and percolation rate.

...prevailing wet condtions after rains due to the high soil moisture content.

ZONE THREE: 359

Quadrangle #359 has an overall rating of minus three. Within this category it is ranked second. The total extent of this impact area within the 359 quadrangle is 3,894.24 acres. The area covered by actual field checking on this quadrangle is 556.32 acres composed of plots MF, MG, MJ, NG, NK, and PH.

Description of the Land Use

Man's land use activities in this area are improved pasture, some row crop farming, and hunting in the underbrush wildlife habitat.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this are, the impact that cannot be avoided, may be:

...reduction of farming during periods of prolonged precipitation.

...some reduction of grazing to prevent erosion caused by overgrazing.

...guiding of residential development away from the impact zones.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, may be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferably above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create a higher scenic value.

...the permanent establishment of low and medium intensity mixed land use.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Farming and residential development in the area will be slightly reduced while recreational use may be greatly increased and grazing may become seasonal.

Land Use Commitment

The irreversible and irretrievable commitment of the present hydrological resource will be the establish-

ment of a fluctuating condition of increased moisture with limited fluctuation of the water table resulting in the permanent establishment of low and medium intensity mixed land uses perhaps of a seasonal nature.

Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in this area are the KAUFMAN- TRINITY (MF, MG, MJ and NG) and EDGE - TABOR (NK and PH) associations which are moderately well and imperfectly to poorly drained respectively. They are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will be permanent as the potential is there to recharge these aquifers. The effects of the major aquifer are not known at this time.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects on land use shifts on the lithosphere may be:

...water in or one the soil interfers with plant growth or cultivation after prolonged rains.

...a somewhat higher risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects of land use shifts on the lithosphere may be:

...increased evidence of shallow, moist, or stony soil limitations.

...increased erosion under higher intensity use.

...a fluctuating change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment if forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Observations showed much coastal bermuda. Hardwood forest cover type was present with very thick underbrush.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects of land use shifts on the biosphere in this area may be:

...killing of trees within three feet elevation of the reservoir pool level.

...a deficiency of nutrients in some of the present understory vegetation types.

The long range (after ten years) secondary impact and effects of land use shifts on the biosphere in this area may be:

...killing of some trees due to nutrient deficiency.

...the establishment of understory shrub vegetation due to increased soil moisture.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,015 acre-feet per square mile. Runoff is approximately 355 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area may be:

...an increase in moisture content of the soils of the area and a fluctuating water table with seasonal precipitation.

...restriction of row crop farming to non-fertilizer crops because of influence on water quality of aquifer outcrop.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area may be:

...a permanent increase in the moisture ceontent of the soils.

...an increase in the level of the water table, but fluctuating with seasonal precipitation.

...some areas will approach wetter conditions due to a lower infiltration and percolation rate.

...some prevailing wet conditions after rains due to the high soil moisture content.

ZONE THREE: 158

Quadrangle #158 has an overall rating of minus three. Within this category it is ranked least critical. The total extent of this impact area within the 158 quadrangle is 2,318 acres. The area covered by actual field checking on this quadrangle is 463.6 acres composed of plots EM, DM, DN, DP and CP.

Description of Land Use

Man's land use activities in this area are farming row crops, grazing cattle, and small flood control reservoirs. The village of Montfort is on the edge of the impact zone and will not be measurably effected.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, that which cannot be avoided, will be:

...restriction of farming on lower areas to driest seasons for crops such as feed grains and cotton due to very high moisture content during the wet seasons making present cultivation methods and access unfeasible.

...a continuation of grazing on upper slopes but a seasonal restriction on lower areas more susceptible to wetting.

...a restriction in low areas of residentially oriented activities such as building, sewage disposal, cometaries, and road building.

...increased pressure on flood control reservoirs due to decreased drainage in impact zone.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, will be:

...increased recrational potential may develop by use of Green Tree Reservoirs concept.

...increased grazing potential on upp er slopes where not restricted by pollution danger to the reservoir.

...the permanent establishment of low and medium intensity mixed land use.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Intensive use for farming and grazing will be lost in the lowlands.

Land Use Commitment

The irreversible or irretrievable commitment of the present land use resource will be a permanent condition of increased moisture. This will necessitate a permanent reduction in land use intensity. More research is needed to determine intensity of use that the land can support without change.

Description of the Lithosphere

The soils in this area are the TRINITY CLAYS and the HOUSTON - SUMTER CLAYS, both of which are moderately well drained. The field checked map locations are EM, DM, DN, DP, and CP. The TRINITY CLAYS are susceptible to erosion and standing water due to the poorly drained characteristics of the soil.

Impact Analysis of the Lithosphere

The short range (within five years) secondary effects of land use shifts on the lithosphere may be:

...water in or on the soil will interfer with plant growth or cultivation reducing access of heavy equipment to fields.

...a relative high risk of erosion on slopes unless close-growing plant cover is maintained, and row crop farming changed to pasture.

The long range (after ten years) secondary effects of land use shifts on the lithosphere may be:

...a change in drainage pattern of the soils due to a constant and increased wetness caused by the interaction of the reservoir, soils and recharge areas.

...increase slump erosion may occur on slopes as wetness increases.

Description of the Biosphere

The biosphere description of the encompassing environment is rangeland and farming.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects of land use shifts on the biosphere in this area will be:

...increased moisture will necessitate some change in row corps and pasture grasses.

The long term (after ten years) secondary impact and effects of land use shifts on the biosphere in this area will be:

...conversion of land use in lowlands to wet crops or Green Tree Reservoir concept.

...seasonal use of lowlands for grazing.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is

composed of precipiation and runoff. Precipitation is approximately 1,925 acre-feet per square mile. Runoff is approximately 325 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area may be:

...an increase in moisture content of the soils with a slightly fluctuating water table due to seasonal precipitation and land use.

...restriction of row crop farming to non-fertilizer crops because of influence on quality of ground water.

...a seasonal shift in grazing on the lowlands.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area may be:

...a permanent increase in the moisture content of the soil.

...an increase in the level of the water table with possilibity of great fluctuations depending on local as well as upstream precipitation.

ZONE THREE: 159

Quadrange #159 has an overall rating of minus three. Within this category it is ranked least critical. The total extent of this impact area within the 159

quadrangle is 4,450.56 acres. The area covered by actual field checking on this quadrangle is 649.04 acres composed of plots BB, CB, DB, EC, FK, EL, and EM.

Description of the Land Use

Man's land use activities in this area are farming and grazing with some residences scattered throughout the area.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on intensity of land use in this area, the impact that cannot be avoided, may be:

...reduction of farming during periods of prolonged precipitation.

...reduction of grazing to a seasonal basis to prevent erosion caused by overgrazing.

...guiding of residential development away from the impact zones.

...present areas of cultivation could be converted to improved grazing land.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, may be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferably above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create higher scenic value.

...permanent establishment of medium intensity mixed land use.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Farming and residential development in the area will be slightly reduced while recreational use may be greatly increased. Lowlands may be available to grazing on a seasonal basis.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a fluctuating condition on increased moisture with limited fluctuation of the water table. This condition will demand low to medium intensity land uses that will be compatable to environemntal quality and the local economy.

Description of the Lithosphere

The lithospheric condition of the encompasing environment is defined as soil and geological character-

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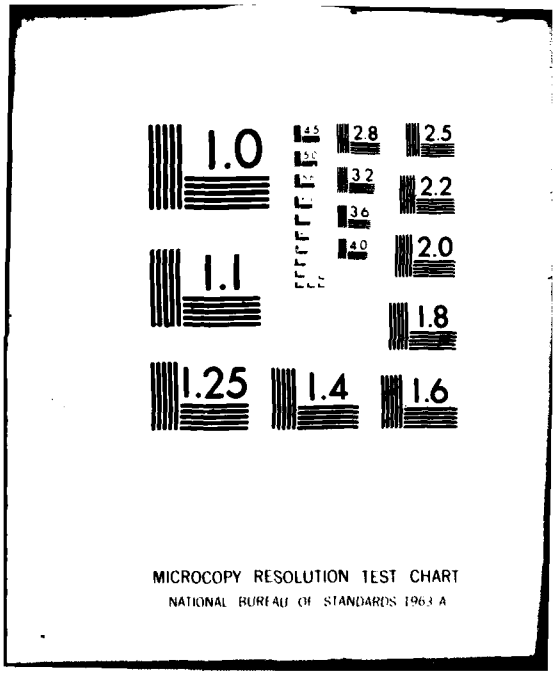
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istics. Soils in this area are the TRINITY (BB, CB, DB, and EC) and HOUSTON - SUMPTER (FK, EL, and EM) associations which are moderately to imperfectly and moderately well to imperfectly drained respectively. They are susceptible to erosion.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of land use shifts on the lithosphere may be:

...water in or on the soil interfers with plant growth or cultivation after prolonged rains.

...a somewhat higher risk of erosion unless close-growing plant cover is maintained.

The secondary long range (after ten years) effects of land use shifts on the lithosphere may be:

...some increased evidence of shallow, moist, or stony soil limitations.

...slightly increased erosion potential.

...a change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted. Observations showed the presence of

winter oats and coastal bermuda with row crops also being present throughout the area.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects of land use shifts on the biosphere in this are may be:

...killing of trees within three feet elevation of the reservoir pool level.

...a deficiency of nutrient in some of the present understory vegetation types.

The long range (after ten years) secondary impact and effects of land use shifts on the biosphere in this area may be:

...killing of some trees due to nutrient deficiency.

...establishment of understory shrub vegetation due to increased soil moisture

...seasonal use of lowlands for grazing.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,040 acre-feet per square mile. Runoff is approximately 350 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere in this area may be:

...a fluctuating condition of soil moisture in lowlands and especially a reservoir edge.

...an increase in surface runoff to reservoir edge if farming and grazing remain intensive on reservoir edge.

The long range (within ten years) secondary impact of the shifts in land use on the hydrosphere in this area may be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table, but fluctuating with seasonal precipitation.

...area will approach wetter conditions due to a lower infiltration and percolation rate.

...prevailing wet conditions after rains due to the high soil moisture content.

ZONE THREE: 211

Quadrangle #211 has an overall rating of minus three. Within this category it is ranked least critical. The total extent of this impact area within the 211 quadrangle is 927.20 acres. The approximate area covered by actual field checking on this quadrangle is 463.60 acres composed of plots NA, NB, NC, MD, and KB.

Description of the Land Use

Man's land use activities in this area are farming and grazing with scattered residences in the area.

Impact Analysis on Land Use

The short range (within five years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, may be:

...reduction of farming during periods of prolonged precipitation.

...reduction of grazing to a seasonal basis to prevent erosion caused by overgrazing.

...guiding of residential development away from the impact zones.

...restricting use of transportation routes close to the reservoir to low intensity use.

The long range (after ten years) primary impact and effects on the intensity of land use in this area, the impact that cannot be avoided, may be:

...a restriction of area to recreational use with housing zoned to keep sewage disposal drainage away from the reservoir, preferably above the topography break.

...a restriction of reservoir boundary area to a tree conservation zone to check erosion and runoff into the reservoir and to create a higher scenic value.

...permanent establishment of medium intensity mixed land use.

Land Use Productivity

The long term (after ten years) land use activity and productivity of this area will be changed. Farming and residential development in the area will be slightly reduced while recreational use may be greatly increased. Lowlands may be available to grazing on a seasonal basis.

Land Use Commitment

The irreversible and irretrievable commitment of the present land resource will be the establishment of a fluctuating condition of increased moisture with limited fluctuation of the water table. This condition will demand a land use commitment to low and medium intensity uses that will be compatible to environmental quality and the local economy.

Description of the Lithosphere

The lithospheric condition of the encompassing environment is defined as soil and geological characteristics. Soils in the area are the BELL - BURLESON and EDGE - TABOR Associations which are moderately well and imperfectly to poorly drained respectively. They are susceptible to erosion.

The underlying geology is an outcropping of a major aquifer group and does influence the hydrology of the impact area. The influence will support existing drainage characteristics of the soil.

Impact Analysis of the Lithosphere

The secondary short range (within five years) effects of land use shifts on the lithosphere may be:

...water in or on the soil interfers with plant growth or cultivation after prolonged rains.

...a somewhat higher risk of erosion unless close-growing plant cover is maintained.

...shoreline erosion impact on steeper banks only.

The secondary long range (after ten years) effects of land use shifts on the lithosphere may be:

...some increased evidence of shallow, moist, or stony soil limitations.

...slightly increased erosion depending on land use intensity.

...a change in drainage pattern of the soils.

Description of the Biosphere

The biosphere description of the encompassing environment is forest and agriculture. The impact area is partially forested. The forest occurs in patches and is composed of bottomland hardwoods. These species are shallow rooted.

Impact Analysis of the Biosphere

The short term (within five years) secondary impact and effects of land use shifts on the biosphere in this area may be:

...killing of trees within three feet elevation of the reservoir pool level.

...a deficiency nutrient in some of the present understory vegetation types.

The long range (after ten years) secondary impact and effects of land use shifts on the biosphere in this area may be:

...killing of some trees due to nutrient deficiency.

...the establishment of understory shrub vegetation due to increased soil moisture.

Description of the Hydrosphere

The hydrosphere of the encompassing environment is composed of precipitation and runoff. Precipitation is approximately 2,005 acre-feet per square mile. Runoff is approximately 345 acre-feet per square mile.

Impact Analysis of the Hydrosphere

The short range (within five years) secondary impact of the shifts in land use on the hydrosphere of this area may be:

...an increase in the moisture content of the soils of the area and a fluctuating water table with seasonal precipitation.

The long range (after ten years) secondary impact of the shifts in land use on the hydrosphere in this area may be:

...a permanent increase in the moisture content of the soils.

...an increase in the level of the water table, but fluctuating with seasonal precipitation and reservoir level.

...some areas will approach wetter conditions due to a lower infiltration and percolation rate.

...prevailing wet conditions after rains due to the high soil moisture content.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

A reconnaissance level inventory of a concept land use plan for the region of the proposed Tennessee Colony Dam Site 2-A is presented. The plan reflects the capability of the land for development and is based on ecological considerations. It should be considered only at a regional level presenting alternative considerations. It does not substitute for more detailed investigations at the county and local level where choices of land use alternatives should occur by the land owner. This plan presents only a framework of some of the more important alternatives.

In the seven county 2,000 square mile study area, available data on several environmental strata were assembled. A map gridding system was used to systematize the data for map display. Data is presented in environmental patterns so that interrelationships can be easily seen.

A new pattern and environmental strata that will evolve, due to reservoir construction, is that of the "impact zone" created by a change in the air-water flux of the soil. This results from reservoir influence on the central environmental component of water balance. This zone has nodes of greatest impact (-9), medium impact (-6), and minor

impact (-3). The entire zone borders the reservoir.

The zone has direct bearing on the alternative land use choices and land use intensities of the area. An on-site study of one hundred and six (106) square miles of the two hundred and fifty-seven (257) square mile impacted area as well as its environs provided insight into present land use conditions.

CONCLUSIONS

It is concluded that all land use shifts that will be created by the reservoir should be determined from close cooperation between local land owners and wise use of available land conservation programs. Some further selected conclusions are drawn from the report section on environmental impact analysis where they are listed in detail and keyed to exact map locations. In the areas of greatest impact, some important conclusions that will influence intensity of land use are:

...water in or on the soil will interfere with and may even disrupt plant growth and cultivation.

...transition will occur from upland hardwoods to tree species common in some of the bottoms.

...natural reproduction of present tree species will be hampered.

...farming will be reduced to only the dryest seasons as the moisture content of the soil will be too high during wet seasons for heavy equipment.

...residential development must be shifted away from these areas.

...grazing, farming, residential and industrial development will be greatly reduced or terminated depending on local conditions.

...trees within three feet elevation of the reservoir pool level will be killed.

In the area of medium impact, some important conclusions are:

...the limiting factor of soil wetness will be similar but less than that of the greatest impact areas.

...a medium risk of erosion will be present unless close-growing plant cover is maintained.

...trees within three feet elevation of the reservoir pool level will be killed.

...natural reproduction of tree species may be hampered.

...encroachment of understory vegetation in wooded areas will increase.

...farming will be restricted during periods of prolonged precipitation.

...recreational and agricultural use of the area can directly pollute the reservoir via unchecked sewage disposal drainage directly into the water table and surface runoff of fertilizer from improved pastures.

...the level of the water table will increase.

...a permanent condition of increased soil moisture will be established with some fluctuation of the water table depending on local moisture imput.

In areas of minor impact some important conclusions

are:

...water in or on the soil may interfere with plant growth after prolonged rains.

...encroachment of understory vegetation in wooded areas may occur due to increased soil moisture.

...residential development must be guided away from impact zones.

...fluctuations in water table will depend on interrelationship between reservoir and precipitation fluctuations.

...wet conditions will prevail after rains due to high soil moisture.

RECOMMENDATIONS

Some selected recommendations are drawn from the section on environmental impact analysis where they are discussed under resource productivity and resource commitment and keyed to exact map locations. It is recommended that:

...a detailed land use plan should be done on all areas immediately adjacent to the reservoir. The reservoir edge must be planned for and treated as one entity. Some components of the investigations would be land use, land use intensity, land ownership, land ownership profile, forested filter strips, green tree reservoirs for wildlife, locations for row crops and locations for pasture.

...land management programs of federal and state government should focus on the conservation areas and develop action programs. First a comprehensive, then a project by project management plan could be set forth. The comprehensive level must provide land owners with a choice of land uses and management practices so that the individual rancher controls the

degree and rate of change in his life style. The project level management plans must be developed on a land use intensity basis. True, any particular land use intensity may cover several ownerships, but the ecological capability of the land resource--however the reservoir has changed it--must form the basis for on-the-ground management.

...the study area be used as a national laboratory for the development and testing of impact analysis techniques on land use adjustments that can greatly mitigate any negative impact caused by reservoir construction.

...this study be viewed only as a framework and that all involved recognize that much is yet to be done.


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